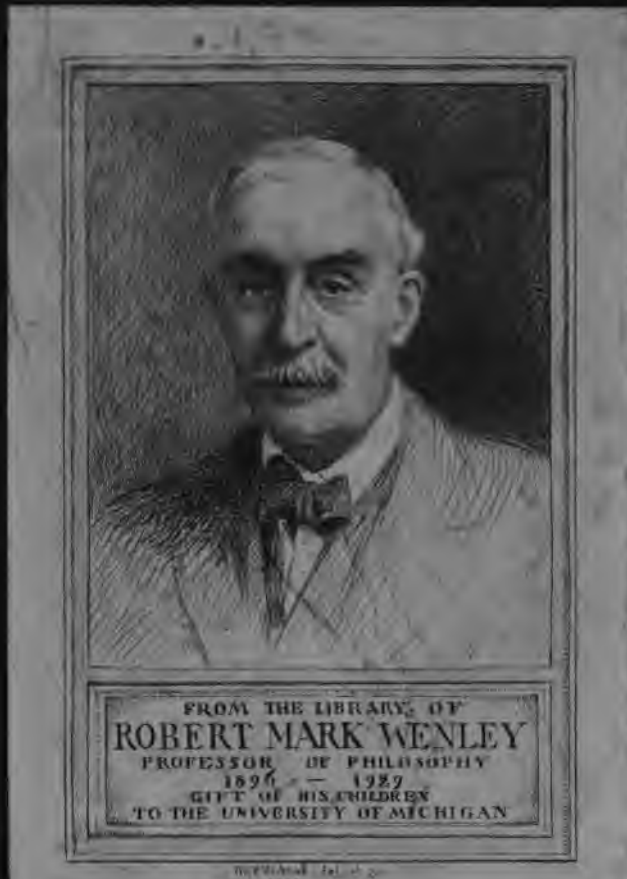

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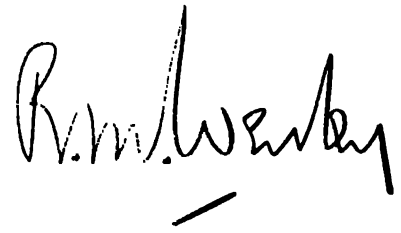

THE BASIS OF EVOLUTION

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THE

PHILOSOPHICAL BASIS

OF

EVOLUTION

BY

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PREFACE

THE subject of discussion in the following pages is not so much Evolution, in the ordinary sense of the term, as the Fundamental Principles which underlie this doctrine. The relation of Determinism to Evolution, and to the whole process of organic nature, which is the main idea of the book, suggested itself to my mind as far back as the year 1848. Nine years later, in a small anonymous book on Theism,[1] now long out of print, I gave a brief statement of my views on the subject. In the "Philosophical Magazine" for July 1872, the argument was more fully stated in an article on "What Determines Molecular Motion;" and, in the "British Quarterly Review" for January 1883, the subject was discussed at still greater length in an article entitled "Evolution by Force Impossible."

The present volume is not of a speculative or hypothetical character. The reader will readily perceive that all the main conclusions are, without exception, deduced from facts or from fundamental principles.

[1] *Philosophy of Theism*. London (Ward & Co.). 1857.

Most of them, indeed, are in some form or other necessary consequences of the great principle of Causality; viz., "Everything which comes to pass must have a cause."

As certain views of Free-will have, unfortunately, led to misconceptions regarding the very nature of Determinism, I have entered at some length into their consideration; but, to prevent confusion, I have placed such portions of their discussion as do not form part of the main argument of the work at the end of the volume, in the form of an Appendix. The considerations there adduced will, I trust, tend to prevent any misconceptions arising regarding the ethical tendencies of Determinism: while readers who may not agree with what is there urged need not be thereby deterred from fully accepting the main conclusions of the work.

I must here express my obligations to kind friends for their assistance while the book was passing through the press. My thanks are specially due to the Rev. David E. Irons, B.D., and the Rev. David Caird. As I was in ill-health at the time, the revision of the proofs and other details devolved mainly on them. To the latter I am indebted for the excellent and copious index at the end of the volume.

PERTH: *September* 11, 1890.

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THE PHILOSOPHICAL BASIS OF EVOLUTION

CHAPTER I

EVOLUTION: ITS FUNDAMENTAL PRINCIPLE

THE universe may be viewed under two different aspects—the statical and the dynamical. Under the former we consider the nature of things as they simply co-exist in space; under the latter we inquire into things in their order of succession in time. Evolution is mainly concerned with the latter. It regards the world as a succession of events—as a process in time, a gradual transition from the simple to the complex, from the homogeneous to the heterogeneous, from the indefinite to the definite, and from the definite to the more definite, a change from the general to the particular. Evolution looks on every change as conditioned by its antecedent or efficient cause. Everything is regarded as under the domain of causality. Nothing happens without a cause, and the same causes acting under the same conditions will always produce the same effects. All events are considered to be the pro-

ducts of continuously operating causes, and no breaks or stoppages in the sequences of phenomena are recognised. An all-pervading uniformity in nature is assumed. The modern biological doctrine of evolution regards the higher and more complex forms of life as gradually arising out of the lower and more simple. Every kind of being is regarded as a product of modifications wrought by insensible gradations on a pre-existing kind of living thing.

This may be regarded as a brief statement of the great leading principles on which all Evolutionists are found to agree, principles which recent biological researches are tending daily to confirm, and which will, doubtless, ere long be universally accepted.

When we leave the established facts and principles, and begin to inquire into the causes of evolution and the nature of those agencies by which the process is brought about, we soon meet with a diversity of opinion. At present, most Evolutionists regard the process as purely mechanical and physical, the result of matter, motion, and force alone; to be explained, if explicable at all, in terms of these elements.

It is one of the chief objects of the present treatise to demonstrate that such is not the case, and that it is absolutely impossible that the process of nature can ever be accounted for, without going beyond what is to be found in matter, motion and force. The belief that it can be so explained has arisen, I think, from a mistake as to what really is the fundamental cause of evolution—that thing which, of all others in the process, requires to be accounted for.

Let us, then, turn our attention to the fundamental cause of evolution. Although the general principles about to be discussed, apply equally to evolution under every form, whether organic, mental, moral or social, I shall, in order to simplify considerations and prevent confusion, confine my inquiries in the first place to the evolution of organic nature. The bearing of these principles on mental and moral questions will afterwards come under our notice.

What then is the fundamental problem of organic evolution? It is an opinion which is daily gaining ground that at some future time, perhaps not far distant, all the purely physical sciences will be brought under a few general laws and principles. However wide and diversified physical phenomena may seem at first sight, and however great and radical the apparent distinction between the several sciences, yet to the eye of the thoughtful physicist, who sees deeper into the subject, they begin to appear as but the varied modifications of a few common principles. For example, heat, electricity and magnetism are, in their ordinary phenomena, very unlike each other; yet modern investigation has shown that they are mutually convertible. Heat can be converted into electricity, and electricity into magnetism. Magnetism can be converted into electricity, and electricity into heat. This indicates that the corresponding *sciences* are not radically distinct, that their phenomena have a common origin, that in each we have the same force manifested under different forms.

To arrive at unity among the facts of nature

has ever been, and ever will be, the aim of physical investigation. We try to induce a unity amongst the multifarious facts of the senses by bringing under a certain conception as many of them as can be rationally connected by it. But we soon find that we must have a higher unity; and we endeavour to reduce the number of our conceptions by finding one of a higher order; and so on, ever trying to reach the highest unity, the most general conception possible.

The point, however, which more immediately claims our special attention, is this:—As the physical sciences proceed in their generalisation, they advance more and more towards Molecular Physics. We may illustrate our meaning by examples without number from any of the sciences. In electricity, for instance, all the ordinary questions—such as how a Leyden jar becomes charged, or how the electricities are supposed to be decomposed on a conductor, or by what means one body charged positively will act upon another charged negatively—were formerly considered to be answered quite satisfactorily without making any reference whatever to the molecular condition of the bodies under the electric influence. But when we come to inquire more deeply into what is meant by induction, when we ask what that peculiar condition is which constitutes the charged jar, and what the nature of the hidden change which takes place on the conductor while what we call its electricities are being decomposed—we begin to find that we are entering upon deep and difficult questions regarding the hidden operations taking place among the molecules

of the electrified body. Formerly electricity was supposed to be a fluid substance altogether distinct from the body in which it manifested itself; and, of course, inquiry was directed towards this hypothetical substance, and not to the molecular condition of the body. But the grounds for believing in the existence of this hypothetical fluid have now disappeared; and electricity is generally believed to be a state of motion of the molecules of the electrified body itself. Similarly, heat was at one time considered to be a substance, to which the name caloric was applied. It is now, however, proved to be not a substance, but a particular mode of motion of the atoms of the heated body. The same is proved to be the case in regard to light; and magnetism, which was formerly explained by means of hypothetical fluids, is now believed to consist also in a particular molecular condition of the magnetic body; whilst chemistry is fast becoming a question regarding the dynamical action of the atoms of the combining substances.

In Physical Astronomy, questions regarding the constitution of the sun, the fixed stars and nebulæ, are now being determined by molecular physics; and even the direction and velocity of their motions are resolved by the same method. Physical inquiry in every direction is converging towards molecular physics; is resolving itself into questions regarding the dynamical action of the ultimate particles of matter. In short, all forms of energy are now regarded as modes of motion.

If the foregoing be true of the inorganic world, it

is true in a still higher degree of organic nature. There is no organism in the world whose career if traced back would not be found to have begun in a structureless and colourless substance, to which the name of *protoplasm*, or matter of life, has been given. And it is to the movements, disposition, and arrangements of the molecules of this structureless substance that the form of every organic being on the globe owes its origin. Every plant, every animal, is built up molecule by molecule.

All physical investigation is tending towards the solution of the two great questions: (1) What is the *constitution* of the ultimate atoms and molecules of matter—what is their real nature? (2) What is their *behaviour*—what the laws of their motion? These are the two important problems which first present themselves for solution; but neither of them, as we shall see, is the grand and fundamental problem. Evolution, however, is mainly concerned with the second of these two problems, for it has to do not so much with the nature of the molecule as with its motions.

Here at this point we come to a distinction, one which is by far the most important within the whole field of evolution. A further analysis separates this latter problem into two elements radically and fundamentally distinct. For in regard to all physical change or motion, no matter what the nature of that change or motion may be, at the very outset two fundamental questions arise, viz., What *Produces* the change—causes motion? What *Determines* or directs it?

The answers to these two questions lead us int

two totally different paths. And the overlooking of the distinction between the paths, or the confounding of them, has led to no end of confusion. The final explanation of evolution is, however, to be found only in one of the two paths. But in investigations into the cause of evolution the wrong path, as will be seen, has been frequently, if not generally, taken. It has been almost universally assumed that the grand question is: What is that which produces those changes or motions in organic nature which result in the formation of an organism? Consideration, however, shows that the formation of the organism is not to be accounted for by the forces which produce the motion, but by the cause or causes which direct the operation of the forces.

It may be replied that a knowledge of the forces and the laws of the forces will suffice. And it is true that this will suffice to a certain extent; but nevertheless it still leaves the mystery of the cause of evolution, as deep as ever. Law, of course, is not an agent in any sense of the term; it produces nothing, has no causal connection with anything. Law in the material world is just the expression of the manner in which forces act in the production of their effects, or, as Mr. Lewes states it, "the paths along which they travel to their particular results."

In the production of all physical phenomena we have two distinct elements; viz., force and the way or manner in which force acts—force and the paths along which it travels, so to speak—or, in other words still, force and the laws of force.

One of the most important results of modern physical inquiry has been to show that the various phenomena of light, heat, electricity, &c., are but different modifications of the action of the same forces. When the forces take one path, we have light; when they take another, we have heat; another, electricity; and so on. Now it will be observed that the fundamental question is not, what is the particular force in action, or upon what does its exertion depend? but rather, what is it that causes the force to act in the particular manner in which it does act? In other words, what determines the paths along which it acts? Material phenomena, whether in the physical or in the organic world, are produced in general by the motion of the molecules or of the atoms of bodies. Now the great question is not simply what produces the motion? but what produces the particular kind of motion? It is not what gives *existence* to the motion but what *determines* its *direction*? This is evident, because the particular phenomenon with which our inquiries are concerned does not directly depend upon the mere existence of the motion, but upon its special direction or determination. The same exertion o. force which produces one phenomenon would probably produce any other phenomenon, were determination n the proper direction given to it. It is the *determination* of the force which accounts for the particular phenomenon; the mere *exertion* of force may be supposed to be the same in all phenomena.

If force can direct its own movements, determine its own path, then those Evolutionists to whom I have

referred may be on the right track; but if it be absolutely impossible, as I hope to show, that the operations of force can be determined by force, then no amount of inquiry into force will ever lead to an explanation of the cause of evolution.

The grand principle of evolution is, therefore, DETERMINISM. *Determinism is The Foundation Stone of Evolution.* But it is, however, a somewhat unfortunate word for the fundamental principle of evolution, for the word has already been appropriated to designate the doctrine that the will is invariably determined by the strongest motive. I have, however, been wholly unable to find a word more appropriate. The word will be seen to be still more appropriate when we come to consider that Determinism in reference to the will, is but a special form of that more general determinism which constitutes the fundamental principle of evolution. I may here state that one may hold determinism in evolution without being committed to the doctrine that the will is necessarily determined by the strongest motive.

In so far as organic nature is concerned, the fundamental question is, therefore, *What determines Molecular Motion and Force?* Every organic being, as we shall see, is just as the motion of the molecules has determined it to be. It is according to the determination and arrangement of the molecules that it is a plant or an animal, or a plant or an animal of a particular order, genus, or species. The solution of the problem: What determines molecular motion? will open up the way, and the only way, that will ever

lead to an understanding of the hidden process of nature. That this is the fundamental problem will be further evident if we examine Mr. Herbert Spencer's famous formula of evolution. "Evolution," he says, "is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation." [1]

This is probably the most abstract, comprehensive, and accurate statement of the process of evolution which we have. But it is evident that the fundamental element in this process is neither Force, nor the Persistence of Force, as Mr. Spencer supposes, but a totally different thing, viz., the *Determination* of Force. If "evolution is an integration of matter," it is obvious that this integration is not the result of the exertion of force, but of the peculiar way in which the force is directed. In other words, the integration is not due to the force, but to its determination. The mere exertion of force will tend to produce disintegration rather than integration. It is the proper determination of the force which produces the integration. The same remark holds true of motion. Integration is not produced by the mere motion of the parts of matter, but by the way in which this motion is directed. And if evolution be a "dissipation of motion," it is such only because the motion is so determined as to bring about that result. And again, if in evolution "matter passes from an indefinite, incoherent homogeneity to

[1] *First Principles*, § 145.

a definite, coherent heterogeneity," it is simply because the motions of the parts of matter are so determined as to produce this effect; and the motions are so determined, because the forces which produce the motions are so determined. It is not the mere exertion of the force which brings about the required result, but the determination of the force. In short, every element in this formula is the result not of force, but of the determination of force; not of motion, but of the determination of motion.

We shall proceed now to the consideration of the two fundamental theorems on which Determinism is based. The first of these forms the subject of the next chapter.

CHAPTER II

THE *Exertion* OF FORCE AND THE *Determination* OF FORCE, THE *Production* OF MOTION AND THE *Determination* OF MOTION, THE *Production* OF AN ACT AND THE *Determination* OF AN ACT, ARE ABSOLUTELY AND ESSENTIALLY DIFFERENT

THE radical and essential distinction between force and the determination of force, between motion and the determination of motion, between action and the determination of action, could not possibly have escaped observation; but the important bearing that this distinction has on the whole question of evolution has certainly been overlooked.

In physics we have been accustomed to attribute everything to force; force, at least, has always been regarded as the all-important element. This, however, is a mistake: for, as we shall see, far more depends upon the *determination* of force than upon its *existence*; and therefore, *unless force be determined by force, the most important element in physical causation is a something different from force.* And this holds equally true whether our inquiries relate to the inorganic or to the organic world.

In the production of organic forms from the simplest up to the most special and complex in the vegetable and animal kingdom, two things required to be accounted for; viz., (1) the motion of the matter of which they are composed, and (2) its *disposition* or *arrangement* with reference to time and space. The particles which are to compose the organism must not only move, but move with a particular determination in regard to time and space. If a molecule has to be placed in any particular place of an organism, it must move in the particular direction in *space* which will lead to that place, and stop at the particular moment of *time* when it reaches it.

Motion is not only produced, but it is produced in a particular manner, and under particular conditions or determinations in regard to time, space, and other circumstances. In other words, not only must something produce the motion, but something must determine it also. The causing of, or giving mere existence to the motion, I have called the *Production* of the motion. The causing of it to happen in the particular manner in which it does, rather than in some other manner, I have called the *Determination* of the motion. It must be evident to everyone who will consider the matter, that these two things are radically distinct. And not only are they radically distinct, but they must be separately accounted for. To account for the mere existence of motion does not account for its happening in one way rather than in some other. It is quite true that the one cannot be produced without the other. We cannot determine motion unless

there is a motion to be determined; we cannot determine that which has no existence; neither, on the other hand, can we produce motion without at the same time giving it some particular determination in regard to time, place, or other circumstance. But, although the one cannot be produced without the other, yet the two are results of different agencies; and the discovery of a sufficient cause for the one does not in the least degree satisfy the mind as to the presence of the other. To account for the motion of a ball does not account for its moving, say, east rather than west, or in any other possible direction. A force, it is true, cannot act without at the same time acting in some particular way, or move a body without moving it in some particular direction; but to account for the one does not satisfy the mind in regard to the other. The explosion of the powder within a gun is a sufficient cause for the motion of the ball, but the explosion of the powder is not to the mind a sufficient cause for the ball moving east rather than west, or in any other direction. The mere exertion of force does not explain how it is exerted thus and not otherwise. The exertion of force and the determination of force are two things absolutely different, and what holds true of *motion* and *force* holds equally true of the more general and comprehensive conception of *action*. Whether it be a physical act, a mental act, or an act of the will; to account for the production of the act does not in any way explain how it happened as it did and not otherwise. The reason is obvious, for the production of the act and its determination are two things absolutely different in

their essential nature. This point will, however, come more fully under our consideration in a subsequent chapter.

The grand and fundamental question then is—What is it that determines molecular motion in organic nature? What determines and directs the action of the forces concerned in the production of specific forms in the inorganic and organic world? Is it a force? Is it energy? This leads us to the second theorem.

CHAPTER III

IT IS ABSOLUTELY IMPOSSIBLE THAT THE EXERTION OF A FORCE CAN BE *Determined* BY FORCE, OR THAT MOTION CAN BE *Determined* BY MOTION, OR ACTION BY ACTION

THAT the action or exertion of a force cannot be determined by the action or exertion of a force is demonstrable thus. If the action of a force is determined by an act, then this determining act must itself have been determined by a preceding act; and this preceding act by another, and so on in like manner to infinity. This is evident; for if the act which determines the action of the force exist at all, it must at least exist in time and space, and must have a determinate existence in reference to time and space, and if so, something must have given it that determinate relation. If it be replied that it was a prior act which determined this determining act, then that prior act, in order to give the determining act the proper determination, must itself have been properly determined; and the question again recurs, what gave the prior act the proper determination? If the determination was given by an act still prior, that act itself must have been

properly determined; and if so, then there must have been another act preceding which gave it the proper determination, and so on in like manner to infinity. The reason of all this is perfectly obvious. When we account for the determination of an act by assigning an act, we account for it by means of a something which requires itself to be accounted for in a similar manner. To make the matter still more plain, suppose that an effort or exertion A of force has been produced. It has not only been produced, but it has been produced at a particular time and place, and in reference to some particular thing; that is to say, the effort not only got existence, but a particular determined existence. There are, therefore, two things which require to be accounted for: (1) the mere exertion of the force—its simple production; and (2) the production of this particular effort A instead of B or C, or any other possible effort, and its production at this particular time and place rather than at some other. That is, we have to account (1), for its *production*, and (2), for its *determination*. Now what we are inquiring after at present is not what *produced* this effort or exertion of power, but what *determined* it; that is, what caused this particular effort A to happen rather than B or C or any other, or to happen rather than not to happen, or to happen in the particular manner in which it did happen rather than in some other manner. It must be evident that whatever this cause may have been, it was not an *exertion of force*. For let us suppose that the effort A was determined as to the manner of its happening by an effort B, then

this effort B itself requires to be accounted for in a similar manner: for if the effort B happened, it must have happened after a particular determined manner; and if so, we must ask what determined the effort B, what caused it to happen in that particular manner? And if we say it was by an effort C, we involve ourselves in a similar manner, and so *ad infinitum*.

But even supposing we were to maintain that the determination of the effort A was caused by effort beyond effort *ad infinitum*, it would not help the matter the least; for, on looking at the question more closely we find that it is not the determining act or effort B which determines the effort A, but the *determination* of the determining effort B. We find that if this determining effort or exertion of force B had not been itself particularly determined as to the manner of its happening, the effort A determined by it would not have happened as it did; so its happening in the manner in which it did happen depended upon the effort C which determined the determining effort B. And, again, on looking more closely, we find that it did not depend upon this effort C either, but upon the *determination* of this effort C. And even supposing we were in this manner to go back to infinity, still it would not be the antecedent act which determined the consequent act but the *determination* of the antecedent act which determined it; so that, after all, by no possible means can we conceive determination to be the result of an act or exertion of force. Hence, be the cause of the determination whatever it may, it cannot possibly be an act or exertion of force.

In like manner we can prove that motion cannot be determined by motion. Motion will produce motion, but motion cannot determine motion. A ball A in motion will produce motion in a ball B, but the motion of the ball A will not determine the motion of the ball B either in regard to direction or to the times of its happening. The particular direction taken by the ball B is not due to the motion of A, but to the particular direction in which A is moving at the moment in which it produced motion in B; so that the direction taken by B must be referred not to the motion of A, but to that something whatever it may be, which causes A to move in the particular direction in which it moves. In other words, the determinate direction taken by B is due not to the motion of A, but to the *direction* of the motion of A. In like manner it can be proved that the direction taken by A is not due to the motion of some other body (say C), but to the *direction* of that moving body C. In a similar way we can prove that the particular time at which B begins to move is not due to the motion of the striking body A, but to the *particular time* at which the body A strikes B.

It is needless to show that what holds thus true of force and motion, holds equally true of action and of energy under every possible form. It is as absolutely impossible that an act—be that act what it may—can be determined by an act as that force can be determined by force.

I may illustrate the truth of the foregoing principles by a few examples. Let us begin with attraction and

cohesion, which play so important parts in all physical phenomena, so as to satisfy ourselves that the determination of motion cannot be referred to these.

Suppose two particles, A and B, are at some distance from each other, A being to the east of B. Let them move toward each other under the influence of their mutual attraction, A to the west and B to the east. Their motions are due to attraction, but not the *directions* of their motions. Attraction is the cause of A's motion, but not the cause of A moving west rather than east. This is due not to attraction, but to the fact that B *happened to be on the west side of* A when the motion took place. So the direction taken must not be referred to attraction, but to that something, whatever it may have been, which was the cause of B's happening to be on the west side of A.

In regard to attraction under every form, the direction taken by moving particles is due to the pre-arrangement of those particles in regard to time and space. A difference in pre-arrangement would necessarily produce a corresponding difference in the direction taken by the particles.

Take another very simple case of motion, say the motion of a planet in its orbit. Most people would at first be inclined to refer the circular or elliptical path taken by the planet to the action of force. They would say that the form of the orbit is produced by the action of the two forces, centrifugal and centripetal. But if we examine the matter properly, we shall find that i is produced by no such cause. The mere motion of the planet is indeed due to forces; but the path taken,

whether elliptical or circular, is the result not of forces, but of the way in which the forces are applied. The planet moves in virtue of centrifugal and centripetal forces; but it moves in that particular path because these two forces are so adjusted to each other that the one tends continually to pull the planet in a straight line towards a point called the centre of the orbit, while the other tends continually to make it move at right angles to that line. But it may be replied that par ticular adjustment of the two forces can be referred to a force; for, according to the nebular hypothesis, the motion of the planets in their orbits results as a consequence from the condensation by gravitation of the nebulous matter out of which the system was formed. It is no doubt in all probability true that the entire energy of planetary motion was derived originally from gravitation. The *vis viva* or mere motion of the planets is the result of gravitation; but the paths of the planets—the directions taken by them—cannot be referred to gravitation. The motion of rotation induced in the nebulous mass—the thing which originally determined not only the separate existence of the planets but the form of their orbits—cannot be referred to gravitation, but to the *way* or *manner* in which gravitation acted on the condensing mass. In the condensation of the nebulous mass, if the particles had moved directly towards the centre of gravity of the mass, no motion of rotation would have been induced, and consequently neither planets nor orbits would have ever existed. The paths, therefore, of planets are not due to the condensation of the mass

by gravitation, but to the way in which gravitation acted upon the mass. Had the mass condensed without rotating, all that is now the *vis viva* or energy of the planetary motion would have appeared as heat.

Hence that which determined the existence of the planets as separate bodies, which determined that so much of the energy of gravitation should be converted into *vis viva* of planetary motion instead of into heat, and which determined that the planets should not only move but move in circular or elliptical orbits, was not gravitation, but that something (whatever it may have been) which caused the nebulous mass to condense in such a way as to produce a motion of rotation. Our solar system is therefore the result not of force merely, but also of the *determination* of force. When the matter is properly analyzed, we find that all that belongs to force is merely the *vis viva* or energy that the system possesses. The plan of its existence, the arrangements of its separate parts, and in fact everything else that can be predicted of it but mere energy, are the result of that something which determined or directed the action of the forces concerned in its existence.

Take still another case, viz., that of the parallelogram of forces. I have been asked, Is not the determination of the resultant force, in magnitude and direction, effected by the magnitude and direction of the components? The reply is: certainly the determination is effected by the *magnitude* and *direction* of the component forces; but this is simply saying that

the determination is effected, not by the forces, but by the determination of the forces. *Magnitude* and *Direction* are not forces, but certain determinations of forces. Magnitude is the *determined quantity*; Direction the *determined path* taken by the forces. Consequently it is the determination of the component forces not the forces themselves that determine the resultant force.

Is not each swing of a pendulum, it has been asked, determined by force, for is it not determined by the previous swing plus gravity? And is it not hence and only hence that the course and the amplitude of the next swing admit of being calculated or predicted? The mere motion of the pendulum is, of course, effected by the *force* of gravity, but the direction of that motion is not the result of force but of the *direction* in which the force acts. When the pendulum swinging to the east, for example, reaches the extremity of its swing, gravity acts in the direction so as to make it swing to the west; and when it reaches its western extremity the direction of the action of gravity is reversed, and it again swings to the east, and so on. The swing is therefore determined not by the force of gravity but by the *way* in which the force acts. In other words it is due not to *force*, but to the *determination* of the force. Again the *determined magnitude* of the swing is the result not of force, but of the *determined magnitude* of the force.

Examples of this kind, if necessary, might be multiplied to any extent. In fact, take any case whatever and it can be readily shown that the deter-

mination can in no conceivable way be the result of force.

The vague and indefinite idea that the arrangement of the molecules of matter into crystalline and organic forms is due to the action of forces, appears to be implied in such terms in common use as "structural forces," "formative forces," "crystal-building force," &c. It is supposed that if our mental powers were so enlarged or strengthened that we could perceive everything connected with the forces operating in nature, we should then be able to explain the process by which the organic forms of nature are built up. This, however, is evidently a mistake. Though our acquaintance with the forces of nature were absolutely perfect, the question as to how particles or molecules arrange themselves into organic forms would probably still remain as deep a mystery as ever, unless we knew something more than force.

The mystery is not—What are the forces which move the particles, but what is it that guides and directs the action of the forces so that they move each particle in the particular manner and direction required? Force gives motion to the particles; but we are not concerned about the cause of the motion, only about what *directs* the motion. It is replied that motion cannot possibly take place without its being in some particular direction. But this does not prove that the two things are the same. It only proves that they are inseparably connected. Neither does it prove that the same thing which is assigned as a cause for the one will serve as a cause for the other. Two effects may be inseparably

conjoined and yet result from different causes. But the two effects under our consideration are not inseparably connected. It is true that a molecule cannot move without moving in some particular direction; and thus far the two effects are inseparable; but a molecule may move without moving in the *proper* direction. These molecular forces cannot act without acting in some particular way; but they may act without acting in the proper way. Now what is it that determines that they shall act in the proper way? When a molecule is to be moved, there is an infinite number of directions in which force may be conceived to move it. But out of the infinite number of different paths, what is it that directs the force to select the right path?

Is it asserted that force is self-directing? This is simply getting into confusion again. What conceivable idea can be attached to a self-directing force? Is force a something which not only acts but determines for itself how and when it shall act? In what conceivable way can force direct its own path? A molecule has to be moved into its proper place in an organic form; a force gives motion to the molecule; but out of the infinite number of possible directions in which the molecule may be moved the force moves it in the right direction. What is that something which thus guides the force? The force guides itself, it is replied. Be it so; but in what way does the force direct or guide itself? What is the nature of that something in virtue of which the force directs its actions? Is it supposed that that something belonging to the force

which thus guides and directs its action is itself a force? Does the force direct itself by means of a force? If so, then we are back to our old absurdity of a force determining a force. And if this directing something is not a force, what is it? But if this something is not a force, it follows that there is something else to be known than mere force before we can penetrate the mystery of nature.

The simple truth is that in attempting to account for the *determination* of motion by referring it to a *force*, we are attempting an absolute impossibility. The *production* of motion and the *determination* of motion are two things absolutely different in their essential nature. Force produces motion; but it is as impossible that force can determine motion as that two can be equal to three, or that a thing can be and not be at the same time. The necessity is as absolute in the one as in the other.

If any one imagines that he can conceive motion as being directed or determined by a force, he will find, on subjecting his thoughts to a proper analysis, that the determination is not due to the force which he imagines, but is due to the *direction* in which his imagined force exerts itself. The determination results not from his imagined force, but from the *way* in which his force acts.

We have been accustomed to speak of organic forms being built up particle by particle by the play of molecular forces; and probably most of those who know little about science imagine that scientific men attach some clear and definite idea to such a statement.

They naturally conclude that the scientific physicist understands in some way or other how, and in what way, these forces may be conceived to build up the structure; and they would no doubt feel surprised were they told, what in reality is the plain truth, that the physicist who uses those terms knows just as little about the way in which the play of forces can build up an organic structure as they do themselves. The idea has gained a footing that the thing is done in some way or other by forces; and although in the mean time we cannot comprehend the manner in which it is done, yet we imagine that at some future day all will be plain.

But if it were possible that the *shape* or *form* of any thing in nature could be the product of a force, surely by this time we ought to be able to imagine or conceive how the thing may thus be done in some special case or other. But I have never yet seen the attempt made. Take the simplest of all special forms, viz., the crystal. In what possible way can we conceive the crystalline form to be the product of forces? If there be any form in nature that can be accounted for by means of the "play of forces," we should expect it to be the crystalline. But let us see whether the theory generally held regarding the mode in which the crystal is formed gives any support to the opinion that *form* can be the product of force.

The particles or molecules of which the crystals are composed are supposed to be of a certain definite shape; and it is supposed that they attract one another at certain definite points or along certain

definite lines. The molecules therefore cohere together in a fixed and definite manner; and thus a figure in the form of a crystal is the result. This may or it may not be the true explanation. But it will be at once perceived that all that force does in the matter in such a case is simply to move or draw the molecules and hold them together in the crystalline state. The crystalline *form* is therefore not due to the force, but to the original *shape* of the constituent molecules, together with the fact that they attract one another at definite points. Consequently that which determined the form of the crystal is not the forces, but that something, be it what it may, which is the cause why the molecules have such a shape, and why their attraction is confined to the definite points on the surfaces of the molecules. All that the molecular forces do in the case under consideration is simply to pull; the form of the crystal is due not to the pull, but to that something which gives to the constituent particles their specific shape and directs the forces where and how to pull.

In short, let us in imagination form any conceivable hypothesis as to how an organic or crystalline figure may be produced by a force, and we shall always find, on subjecting our hypothesis to a logical analysis, that the form and the arrangement of the parts result not from force, but from something quite different. We need not feel in any way surprised at this; for we are in reality attempting to do what is in itself absolutely impossible. The production of form, or the arrangements of parts, is what never is, was, or can be effected by a force.

The misleading character of the idea that the forces of nature are determined by force is nowhere better seen than in Professor Tyndall's famous objection to prayer for a change of weather.

To ask for a change in the weather is, according to him, to ask for an infringement of the law of conservation, just as truly as it would be were we to pray that water might flow up hill.[1] Now to give us fair weather for foul requires merely a different determination in the forces which now exist; and, unless force is determined by force, no new creation of force, not even an expenditure of force, is required.

But, in addition, the objection is as far wrong in physics as in philosophy. All matter under every form is in motion. But no energy or expenditure of power is absolutely necessary to direct or deflect this motion either to the right hand or to the left. All that is required is that the deflecting force should act at right angles to the direction in which the particle of body is moving. Deflection to any amount can thus be produced without work. A planet, for example, moving in a circular orbit is being continually deflected by gravity; but gravity in doing this performs no work. If the orbit be elliptical, work is performed *by* gravity in increasing the velocity of the planet as it passes from aphelion to perihelion, and *against* gravity in diminishing the velocity in passing from perihelion to aphelion; but none in deflecting the planet from the straight line. In fact, work is never required to produce deflection. True, deflection seldom takes place

[1] *Fortnightly Review*, December 1865.

without an expenditure of energy; but the energy is required not to produce the deflection, but to produce that increase or decrease of motion which generally accompanies deflection. All the alterations in nature required to give us a change of weather, may thus be brought about without any loss of energy. The relation of prayer to physical law will, however, be more fully discussed when we come to consider Teleology in the light of Determinism.

Leibnitz's celebrated theory of Pre-established Harmony was based on the same erroneous notion regarding the determination of motion. Descartes had maintained that the quantity of motion in the universe was constant, and could be neither augmented nor diminished. Will, he argued, cannot create motion —cannot move a body; but, he asserted, it may direct motion, for the *directing* of motion is totally different from the *producing* of it. Leibnitz, on the other hand, maintained, in opposition to Descartes, that will could no more direct motion than it could create motion; that, in order to direct motion, bodies must be deflected from their former course, but that in consequence of the law of *inertia*, a body could not thus be deflected without an expenditure of force, and that will, therefore, could no more direct motion than it could originate it. It follows, then, he argued, that the motions of our body obey the commands of our will, not because the will has any direct control over them, but because these motions have been prearranged to agree with the volitions of the will. The worlds of matter and of mind are wholly independent

of each other; and the operations of the two agree, according to him, in consequence of a pre-established harmony between them.

Had Leibnitz been aware that motion can be directed without any expenditure of force, he would have found that his theory of pre-established harmony is superfluous even if it were true that will cannot move matter.

Be it observed, however, that although force may deflect motion, yet force is not that which determines and directs it. The determining cause is not force, but that something which determines force to act as it does act, and not otherwise; and this, as has been repeatedly shown, cannot be force.

In order to make the arguments advanced in the foregoing chapters more obvious and better understood, it will be necessary to consider at some length certain points connected with the principle of causality. It will also be necessary to discuss at length certain prevailing misconceptions regarding the very nature of Determination.

CHAPTER IV

MATTER CANNOT *Determine* MATTER, MOTION, OR FORCE

It may be considered superfluous to enter into a discussion in order to show that matter cannot be the determining cause in the operations of nature; for, if force cannot determine molecular motion, much less can the molecules themselves do so. In fact, the primary property of matter, *inertia*, is absolutely incompatible with the notion of Determination. A body, in virtue of inertia, if at rest, cannot move; and, if in motion, it cannot increase or diminish its motion, or turn either to the right hand or to the left. It has no power to change its state. If a change of any kind whatever has to be effected, it must be done by some cause from without.

That matter cannot possibly be a determinator will be better seen when we consider the leading theories in reference to its constitution. This we shall now proceed to do. The first theory regarding the constitution of matter which meets us is the theory that the atoms of matter are absolutely solid.

The Theory of Solid Atoms.—The hypothesis that

matter consists of extended atoms absolutely solid and incompressible, dates back to the time of Democritus. The theory may, however, now be regarded as to a great extent obsolete. If matter were such, it could not possibly possess elasticity. It is true, that an attempt has been made by Sacchi, Herapath, and others to explain elasticity and resilience of colliding bodies by assuming the molecules to be compound; that is, consisting of an aggregate of elementary atoms held separately apart by internal motion. But this is only shifting the difficulty a little further back: for if these elementary atoms were not elastic they could not rebound from one another so as to keep themselves separate and thus confer on the aggregate atom or molecule compressibility and resilience.

Others, again, suppose the atom to be perfectly solid, but assume it to be surrounded by what may be called an atmosphere of force, which confers on the atom the property of elasticity. According to this theory, resilience is produced by this force and not by the solid nucleus; *i.e.*, everything manifested to the senses by matter results from the force and not from the solidity. In fact, we have no means of knowing from the senses whether there is actually such a nucleus or not. It is affirmed that the force must be the force of a something, but it does not necessarily follow on this account that this something must be solid. Of course, if force be a property, it must have a substance or subject to which it belongs. The necessity here is, perhaps, one of thought rather than of things.

It is needless to add that an inert solid atom, whether surrounded by an atmosphere of force or not, cannot possibly direct its own motions. It can neither move nor direct its movements.

The Kinetic, or Vortex Atom Theory of Matter.— Matter, according to this hypothesis of Sir William Thomson, consists of rotating portions of a perfectly continuous, incompressible, and frictionless fluid pervading space. These vortices constitute the matter which we experience. A vortex atom once generated in this fluid will go on for ever, and always consist of the same portion of the fluid first set in motion. Such an atom can neither be divided nor destroyed. It thus possesses, as Mr. Lewes remarks, the fundamental properties of individuality and invariant quantity. Hence we have the indestructibility of matter, and the indivisibility of atoms. These atoms are believed to account for all the known properties of matter except that of gravitation. This hypothetical fluid, out of which the atoms are supposed to be formed, is not, however, matter itself in the ordinary sense of the term, although it is assumed to possess inertia, a property which Faraday considers to be the one essential characteristic of matter. It is the vortex motion given to portions of this fluid substance, which constitutes the atoms and endows them with their material properties.

These vortex atoms, as Professor Veitch says,[1] cannot be regarded as the ultimate in matter. This continuous fluid, which is before the atom, possesses

[1] *Lucretius and the Atomic Theory*, p. 37.

inertia, and must, therefore, be the ultimate, and the vortex atom the pen-ultimate of things. This vortex motion enables the atom to exist as an atom indivisible and indestructible, but it does not enable it to move or to direct its motions. As far as self motion and determination are concerned, the atom is helpless. It only moves when moved; it only turns aside to the right hand or to the left when compelled to do so from without. It may react, but it cannot act. The very idea of action and determination is contradictory to its nature, as it is to that of any other conceivable kind of atom possessed of inertia. The vortex atom may be a cause, but it cannot be a determining cause.

Boscovich's Theory of Matter.—According to this theory the atoms are mere geometrical points, which are centres of force. Boscovich supposes that each ultimate atom may exist to any other atom in various relations; the actual relation in which they do exist towards each other, whether of attraction or repulsion, depends chiefly on the interval between them.

It is urged as an objection to this theory that it does not account for *inertia*, and also does away with the idea of SUBSTANCE. Inertia, however, can be explained, Mr. G. H. Lewes thinks, on dynamical principles without having recourse to what he calls th fiction of inactivity: inertia being the resistance to a change of direction, the resistance being simply the contrary direction of the body which has to be changed.[1] The other objection, viz., that it dispenses

[1] *Problems of Life and Mind*, vol. ii. p. 306.

with the idea of substance, is a purely metaphysical one and requires a metaphysical answer which will shortly come under our notice.

Mr. Herbert Spencer on Matter.—Matter, according to Mr. Spencer, has not that extended solidity which it presents to our consciousness. Were matter absolutely solid, it would be, what it is not—absolutely incompressible. Nor is this all: a body, for example, moving at, say, velocity 4, cannot, by collision, be reduced to velocity 2, without passing through all velocities between 4 and 2; but were matter truly solid this "law of continuity" would be broken in every case of collision—which is impossible.[1]

Our conception of matter, reduced to its simplest shape, is that of co-existent positions that offer resistance, as contrasted with our conception of space, in which the co-existent positions offer no resistance. We think of a body as bounded by surfaces that resist, and as made up throughout of parts that resist.

[1] In his Presidential Address to the Philosophical Society of Washington, 1882, Mr. William B. Taylor gives, what he considers, an unanswerable proof that action can only take place at a distance: "No motion," he says, "could be transmitted *before* contact, for this would be the chimera—*actio in distans*. No motion could be transmitted *after* contact, for then the impinging body could evidently have no more motion than the body impinged upon. And no motion could be transmitted at the *instant* of contact, for this occupies but an infinitesimal of time. But if no motion could be communicated either before, or at, or after contact, it is very clearly established that no motion whatever could possibly be derived from impact pure and simple."

This evidently does not prove the point Mr. Taylor intended, viz., that there can be no action but at a distance. It proves, however, and that incontestably, that matter cannot be absolutely solid and incompressible, the thing for which Mr. Spencer contends.

Mentally abstract the co-existent resistances, and the consciousness of body disappears, leaving behind it the consciousness of space. Hence the necessity we are under of representing to ourselves the ultimate elements of matter as being at once extended and resistant; this, being the universal form of our sensible experiences of matter, becomes the form which our conception of it cannot transcend, however minute the fragments which imaginary subdivisions produce. Of these two inseparable elements, the resistance is primary, and the extension secondary; because it is resistance which distinguishes matter from space. In other words, matter is a manifestation of force. Our experience of force is that out of which the idea of matter is built. It follows that forces, standing in certain correlations, form the whole content of our idea of matter.

Such being our cognition of the relative reality, what are we to say of the absolute reality? We can only say that it is some mode of the Unknowable, related to the matter we know, as cause to effect. But matter, though known to us under relation, is as real, in the true sense of that word, as it would be could we know it out of relation; and further, the relative reality which we know as matter is necessarily represented to the mind as standing in a persistent or real relation to the absolute reality.[1]

As matter, according to Mr. Herbert Spencer, is a manifestation of force, what has already been proved as to the impossibility of force being a determining

[1] *First Principles*, §§ 16, 48.

cause, must also hold true in reference to it. And what holds true of this relative force which we know, must hold true also of the absolute force on which, as according to Mr. Spencer, it depends. This is a point which will come under our consideration more fully in a subsequent chapter.

Lange on Matter.—Elasticity is inconceivable without dislocation of the *relative positions of the particles* in the elastic body. It therefore follows that every elastic body not only is changeable, but also consists of *discrete particles*. Atoms, if elastic, must consist of discrete particles, and therefore of sub-atoms, and these sub-atoms must either resolve themselves into mere force-centres, or, if they themselves are elastic, they must, in turn, consist of sub-atoms, and so on in like manner, to infinity.

Accordingly, says Lange, there is thus contained in Atomism, while it seems to establish Materialism, the principles which break up all matter, and this cuts away the very ground from Materialism itself.

The progress of science leads us more and more to put force in the place of matter, and the increasing exactness of research more and more resolves matter into force. By abstraction we resolve the former into the latter, but always have a something left. This something left we call matter. I abstract motion from a stone; the stone that moved remains over. I then take away its motion by removing the cohesive force of its particles; I have still the matter. analyse this matter into its elements by setting force against force. Finally, I break up in thought the

elementary substances into their atoms, and then the unitary matter and everything else is force. Now, if we resolve the matter into a *point* without extension, and the forces which group themselves about it, then the point, "the nothing," must be matter. What we understand of the nature of a body we call the *properties* of matter, and the properties we resolve back into "forces." Thus it results that matter is invariably what we cannot or will not further resolve into forces. In other words, the unanalysed remainder is always the matter, however far we might choose to carry our analysis. The reason of all this is that Kant's *category of substance* compels us always to conceive one of these ideas as subject, the other as predicate. As we analyse the things step by step, the as yet unanalysed remainder always remains as matter, the true representative of the thing, and to it we ascribe the properties we have discovered. Thus the great truth, "No matter without force, no force without matter," reveals itself as a mere consequence of the principle, "No subject without predicate, no predicate without subject."

The ideas of matter and force, as applied to Nature, can never be separated. The reason why we cannot suppose a pure force, as has been observed, is that although we perceive only force, yet we demand a permanent representative of these changing phenomena, a substance. We say it must be the force of something. But this substance, this something of which force is supposed to be a property, be it observed, is an assumption which is demanded merely by the nature of our thought, and we have no grounds

for concluding, as Helmholtz remarks, that it holds valid for absolute reality.

The notion of matter, even to its incomprehensible residue, says Lange, can not only be reduced to that of force, but that it must also arise again synthetically from these elements, has been shown by Zöllner. In fact, we need only attribute to the abstract ideas of force and motion an independent existence, and we turn them at once into *substance*, and substance in the scientific view completely coincides in this case with "matter."

The conclusion to which we thus arrive, remarks Lange, clearly proves that the whole problem of force and matter runs into a problem of the theory of knowledge.

Since, according to Lange, matter, as far as it can be analysed, is resolvable into force, and since that which cannot be resolved remains as *substance*, it is obvious that matter cannot be a determinator, whether viewed as force or substance. For according to this theory, could we carry our analysis sufficiently far, the substance or matter remaining would become resolved into force.

CHAPTER V

MATTER CANNOT *Determine* MATTER, MOTION, OR FORCE (*continued*)

Schopenhauer on Matter.—Matter, according to Schopenhauer, is what fills space and time as objects of perception. But it is, he says, only as activity that space and time can be filled. Matter, therefore, is nothing more than causation.

Described in his own words it is as follows :

"The law of causation receives its meaning and necessity only from this, that the essence of change does not consist simply in the mere variation of things, but rather in the fact that at the *same part of space* there is now *one thing* and then *another*, and at *one* and the same point of time there is *here* one thing and *there* another: only this reciprocal limitation of space and time by each other gives meaning and at the same time necessity, to a law, according to which change must take place. What is determined by the law of causality is, therefore, not merely a succession of things in time, but this succession with reference to a definite space, and not merely existence of things in a articular place, but in this place at a different

point of time. Change, *i.e.*, variation which takes place according to the law of causality, implies always a determined part of space and a determined part of time together and in union. Thus causality unites space with time. But the whole essence of matter consists in action, *i.e.*, in causation; consequently space and time must also be united in matter; that is to say, matter must take to itself at once the distinguishing qualities both of space and time, however much these may be opposed to each other, and must unite in itself what is impossible for each of these independently, that is, the fleeting course of time, with the rigid unchangeable perduration of space; infinite divisibility it receives from both. It is for this reason that we find that co-existence, which could neither be in time alone, for time has no contiguity, nor in space alone, for space has no before, after, or now, is first established through matter. But the co-existence of many things constitutes, in fact, the essence of reality, for through it permanence first becomes possible: for permanence is only knowable in the change of something which is present along with what is permanent, while on the other hand it is only because something permanent is present along with what changes, that the latter gains the special character of change, *i.e.*, the mutation of quality and form in the permanence of substance, that is to say, in matter. If the world were in space alone, it would be rigid and immovable, without succession, without change, without action: but we know that with action the ideal of matter first appears. Again, if the world

were in time alone, all would be fleeting without persistence, without contiguity, hence without co-existence, and consequently without permanence: so that in this case also there would be no matter. Only through the union of space and time do we reach matter, and matter is the possibility of co-existence, and, through that, of permanence: through permanence again matter is the possibility of the persistence of substance in the change of its states."[1]

This is the view of matter considered in its subjective side or in relation to the forms of our intellect and not to the thing in itself. It is thus objective *activity* in general, for what is material is that which *acts* (the actual) in general, and regarded apart from the specific nature of its action. Matter, merely as such, is not an object of *perception*, but only a thought, and thus is really an abstraction. It only comes into perception in connection with form and quality, as a body, *i.e.*, as a fully determined kind of activity.

Pure matter on the other hand alone constitutes the true content of the conception of *substance*, and is causality itself, thought objectively, consequently as in space and therefore filling it. Of pure matter we have only a *conception*, not perception.

Matter, according to Schopenhauer, is *will* in itself considered objectively; thus what objectively is matter is subjectively will. As the will is the inmost kernel of all phenomenal beings, so matter is the substance which remains after all the accidents have been taken away. As the will is that which is absolutely inde-

[1] *World as Will and Idea*, i. 11, 12; iii. 48.

structible in all existence, so matter is that which is imperishable in time and permanent through all changes. Thus the reason why matter separated from form cannot be perceived or presented in imagination, is owing to the fact that in itself, and as the pure substantiality of bodies, it is really *will* itself. Matter is the visibility of the will.

It must be observed, however, that objective matter with Schopenhauer is purely ideal. "One must be deserted by all the gods," he says, "to imagine that there exists outside of us a real world of objects, corresponding to our representations. There is nothing real but will: all else is representation."

As matter according to Schopenhauer is *will*, and will is force, it cannot possibly be a determinator. The absolute will of Schopenhauer can evidently no more account for the determination of force, than can the absolute force of Spencer.

Hartmann on Matter.—The atom, says Hartmann,[1] is the unit of which every mass is composed, just as all numbers are compounds of one. It is, therefore, just as sensible to ask what is the mass of an atom, as what is the number of unity. He next considers the question whether the atom is anything else than a force, or whether it has a *substance*, and what we are to understand by this term. Science shows us that visual perceptions are excited by ethereal vibrations, auditory perceptions by aerial vibrations, olfactory and gustatory perceptions by chemical vibrations in our sense-organs; that thus all these percep-

[1] *Philosophy of the Unconscious*, ii. 165 (English translation).

tions by no means concern a matter, but a motion, for whose explanation it must again suppose *forces*, which in the last resort turn out to be *manifestations* of combined molecular and atomic forces. All the explanations which physical science gives, or attempts to give, rest on forces. Never, however, as far as physical science reaches, or will reach, can it require anything else than forces for its explanation. On the contrary, where, at the present day, it uses the word *substance*, it understands thereby, as by *matter*, only a system of atomic forces, a dynamic system, and only employs the words *substance* and *matter* as indispensable summary signs or formulæ for these systems of forces.

But I cannot imagine, says the objector, force without matter, for force must have a *substratum* by which and an object on which, it acts, and this is just matter. Force cannot be imagined as independently existing but only existing in unity with matter.

To all this, Hartmann replies, that we can in reality think nothing whatever by substratum. I cannot, he says, see the need of supposing something *behind* force. I maintain that one can quite wel conceive force to be independently existing, we having nothing else to do but retain the idea of atomic forces, which the defenders of matter also possess, as the final unknown cause of motion.

Our present rendering of matter, says Hartmann reconciles the two previously distinct parties of atomis and dynamists. This has been effected by the conversion of atomism into dynamism. By this means all the advantages of atomism, which have gained to

t its exclusive authority in physical science, have thus been secured by *Atomistic Dynamism*.

Dynamism, in order to assume a more definite form, became necessarily converted into atomistic dynamism; for force under it was diffused and formless, but when it referred the play of opposite forces to *force-individuals, i.e.*, atoms, it then gained a tangible form. Atomistic dynamism satisfies all requirements by thus uniting the positive principles of both atomism and dynamism. By force in atomistic dynamism is understood, an attracting or repelling, positively or negatively acting *point of force*.

Leibnitz, says Hartmann, viewed "substance" only as force, and force to him was the only genuine substance, and thus *implicitly* insinuated the motion of Will into substance.

What then is this striving of *force* other than *will*, that endeavour whose content or object forms the unconscious idea of what is aimed at? Force and will would be identical conceptions were it not that by conventional use force is limited to derived forces, *i.e.*, to particular combinations and manifestations of atomic forces, such, for example, as elasticity, magnetism, muscular force, &c. To replace the notion of will by the notion of force will not do. Force is derivative, and only in the scientific sense original; will on the other hand is always original and a much more comprehensible conception than force.

The manifestations of the atomic forces are thus individual acts of will, whose content consists in the unconscious representation of what is to be performed.

Thus matter is in fact resolved into will and idea. Herewith is the radical distinction between spirit and matter abolished; their difference consists only in higher or lower forms of manifestation of the same essence, the eternally unconscious, but their identity is perceived in this, that the unconsciousness manifests itself equally in mind and matter as the intuitively-logical ideal, and dynamically realises the conceived ideal anticipation of the actual.

If matter, as Hartmann concludes, is simply will and unconscious idea, or force and idea, it evidently will not account for the determination of force according to the idea; but a *cause* possessed of will and idea, or rather will and intelligence, as I suggested more than thirty years ago,[1] may be conceived as doing so.

Lotze on Matter.—Matter is considered by Lotze to be the manifestation of something supersensuous. Atoms he regards as the ultimate and unvarying constituent of the physical world; but those atoms are wholly beyond the reach of sense-perception. The atoms remain unaltered and undivided; not however, he supposes, on account of any absolute indestructibility on their part, but because the actual course of Nature yields no opportunities for their dissolution. The atom is regarded as unextended. An extended atom implies the idea of divisibility, and along with this Lotze considers that we cannot get rid of the idea of actual division, and can thus never form a veritable unit.

Extension, he says, cannot be the predicate of a

[1] *Philosophy of Theism*, p. 150.

being any more than an eddy or vortex can be the mode of motion of a single element; both alike can be conceived only as forms of relation between many elements. Extended matter is conceived as a system of unextended beings that by their forces fix one another's position in space, and by the resistance which they offer to any attempt to make them change place, produce the phenomena of impenetrability and the continuous occupation of space. The atoms are regarded as immaterial existences that from fixed points of space control by their forces a definite extent without in the strict sense occupying it. The mutual action and reaction of these unextended points mark out their distances from one another and their relative position, and thus describe the outline of an extended figure just as definitely and certainly as if by permanent extension they occupied the space contained within it. "If we further conceive," he says, "of forces of external attraction and repulsion as attached to these individual real points, considerable aggregates of them would by resistance to penetrative force present the appearance of palpable materiality or by reflection of the light waves, the aspect of a coloured surface, just as much as if the operating beings themselves filled the space with permanent extension of their own." [1]

"With this hypothesis," says Lotze, "of unextended atoms we have removed the only difficulty that coul prevent us from giving ourselves up to the thought o an inner mental life pervading all nature. The indivisible unity of each of these simple beings permits us

[1] *Microcosmus*, i. 35.

to suppose that in it the impressions reaching it from without are condensed into modes of sensation and enjoyment." [1]

Mr. G. H. Lewes on Matter.—According to Mr. Lewes all that we can possibly know is *the Felt.* If there is any reality beyond this, it must, to us, remain for ever unknown. No conclusions can be relied on as certain but those deducible logically or mathematically from the felt. As a consequence, we have no warrant for concluding that there is anything in matter beyond what is felt. All we can positively know of anything cosmical or mental, he says, is how we are affected by it. Atomism and Dynamism are alike admitted by Mr. Lewes only as mere hypotheses in so far as they aid investigation. The atom considered objectively as an isolated element he regards as a fiction, and he entertains the same view in reference to centres of force. "Matter, and the changes of matter, mean the felt and the changes of the felt; and all our knowledge of matter is in feeling, and the changes of feeling. What we do not, and cannot know, is the abstract matter which is more than, or other than the felt and its changes—the substratum of the metaphysicians." What matter is apart from feeling we cannot know; for all knowledge whatever, he affirms, is only feeling, and can never pass beyond the range of feeling. This is evidently Positivism verging into something like Idealism. But whatever matter may be in itself, according to Mr. Lewes, it cannot be anything which can determine its own motions.

[1] *Microcosmus*, i. 360.

CHAPTER VI

DETERMINATION: MISCONCEPTIONS REGARDING ITS NATURE

Nature of Determination.—One of the main difficulties in apprehending the force of the foregoing reasoning, arises, no doubt, from a certain ambiguity and confusion of thought in reference to the nature of Determination. The term in ordinary language implies *action*, comprehends under it the conception of an *act*. In ordinary language we speak about the "act of determining," "the determining act," and so forth. But in the foregoing reasoning I have used the word in contradistinction to action. There is, as we have seen, an absolute and essential difference in the nature of things between action and what I have termed determination. But in common language the two conceptions are usually confounded, or at least comprehended under the term determination. This is a result not to be wondered at when we consider that the two are inseparably connected. For it is absolutely impossible that there can be action without determination. An act cannot happen without happening in some particular or determined manner.

There are perhaps no two things in nature so absolutely different and yet so inseparably connected. It is therefore not surprising that two things so inseparable in nature should be united in thought.

Determination, in the sense in which I have used the term, cannot be conceived to be of the nature of any act. It is not the act but the adjustment of the way in which the act happens. It is not motion, but the particular direction of the motion, or the particular moment when the motion takes place.

Neither can the *cause* of determination be of the nature of an act. A moment's reflection convinces us that determination is the result, as has already been shown, not of an act, but of the particular way in which the act happened. Or, in other words, it is produced not by the act, but by the determination of the act.

Determination by an act, whether it be an act of thought or an act of the will, is just as impossible and as inconceivable as determination by a force; for as the distinction between the production of motion and its determination, or between the production of an act and its determination, is absolute, it must hold as true in the mental as in the physical world. It is just as impossible to conceive the will being determined by an act, or the determination of the will being an act, as to conceive the motion of the cannon-ball being determined by the explosion of the powder. It is difficult to say whether in the physical or the mental world the distinction is of more importance.

It certainly does at first seem strange to say that determination cannot take place by an act of the will.

[illegible] distinguishing [illegible] the will and the determination of [illegible].

[illegible] however, arrived at the exact [illegible] in which determination has been used in the [illegible].

Determination may be viewed under two distinct aspects; or, rather, the term applies to two different things which require to be clearly distinguished the one from the other.

We have already seen that determination and action are inseparably connected. But although an act cannot take place without being determined, yet it may take place without any particular determination. It cannot take place without happening in some particular way, but it may take place without happening in any one particular way. A body cannot move without moving in some direction, but it may move without moving in any one particular direction. In fact, there is in most cases an infinite number of ways in which an act may take place. There is, for example, an infinite number of directions in which a body may be moved. Now determination, in this second sense referred to, is the deciding or determining which of all these possible determinations shall take place. Take the case of motion. There is some cause [illegible] determines which direction, amongst the infinite [illegible] of directions in which a body can be moved, [illegible] taken. The question is not so much what [illegible] particular direction being taken, but what [illegible] taken in preference to all other possible

directions. What is it that determines the one, out of the infinite number of possible directions, which shall actually be taken? It is in this sense that the term is used when it is said that to know what determines molecular motion is the fundamental problem of nature.

But it may be replied that this is a distinction without a difference; for if a body moves at all it must move in some particular direction, and if it does so, it moves in that particular direction rather than in any other direction. This is doubtless true; but the causing a body to take a direction is different from causing it to take a proper direction. The determinations which take place in nature occur not at random but according to a plan—an objective idea. Thus the question is not simply what causes a body to take some direction, but what causes it to take, among the infinite number of possible directions, the proper direction in relation to the idea. In the formation of, say, the leaf of a tree, no two molecules move in identically the same direction or take identically the same path. But each molecule must move in relation to the objective idea of the leaf, or no leaf would be formed. The grand question, therefore, is, What is it that selects from among the infinite number of possible directions the proper one in relation to this idea?

Determination in this latter sense may be regarded as equivalent to *Selection*. There is this objection, however, to the word. Selection implies thought or choice, and it will not do to assume intelligence or will to be concerned in the selection. This must be

proved, not assumed. The word selection, however, if we eliminate the idea of intelligencè and will, conveys pretty clearly what is meant by determination. Clearly enough, then, selection, in this limited sense, whether it takes place at random or according to a plan, cannot, any more than determination, be the result of an act.

Let us now consider whether selection in its mental aspect, as synonymous with choice and belonging to the will, can be the result of an act.

We are here obliged to follow the subject into a somewhat abstruse and debateable region; but this is unavoidable, because it is in reference to the Will that the erroneous notion that determination is something of the nature of an act would seem to have originated. Moreover, if it be conceivable that choice can result from an act, then, of course, there can be no absolute impossibility in conceiving determination in general to result also from action.

Determination in Relation to Will

Choice.—Common language on this matter at the very outset is apt to mislead, for it represents choice as an act. "An act of choice" is, in fact, the expression men daily employ. But, as I have already stated, this arises from a failure to distinguish between the acts of the will and the determination of those acts. The term choice, in ordinary speech, comprehends both elements—the act of the will and the determination of the act. As the former element, however, is always directly cognised by consciousness,

while the latter becomes known, in most cases, only through reflection, it is natural that we should come to designate choice as an *act.*

If, however, we subject the process to a proper analysis, we shall find that the distinction between the acts of the will and the determination of those acts is as real and absolute as between the exertion of a force and the way in which the force is exerted, or between motion and the direction of motion. In short, the distinction is absolute, and belongs to the very nature of action *as action.*

If we are called upon to choose one out of a number of things put before us, we are conscious in making our choice of an act, viz., the act of fixing on a particular one. But this mere fixing on one of the things is not the cause of this one being fixed upon rather than any of the others. The question is, What is it that determines the one to be fixed upon in preference to the others? The mere fixing considered by itself does not explain this any more than the mere motion of a ball accounts for the ball taking one particular direction rather than any other. This fixing on one of the objects is an act of the will of which we are directly conscious, and is wholly different from the determining which one shall be fixed upon. The determining must, in the order of nature, if not of time, be prior to the act of fixing. The fixing must follow the determination, for it is the one determined that is fixed on. The mere act of the will, whatever that act may be, must take place in some determinate way rather than in some other, and if so, then there

must be some cause for its taking place as it does rather than otherwise. The mere taking place of the act does not explain this, for the question is not, What caused the act? but, What caused it thus, and not otherwise, or caused this particular act rather than some other?

A considerable amount of labour has been expended by some metaphysicians in attempting to prove that there is no distinction between the acts of the will and the determination of those acts. They maintain that the very acts of the will themselves are determinations. They have apparently been induced to assume this position by what seems to me to be the needless fear that, if determination be not produced by an act of the will, free-will must be abandoned. It is, of course, essential to freedom, in the sense maintained by those opposed to philosophical necessity, that we shall have the power to determine our acts; but it is not essential that we should have the power to determine them by the *action* of the will—a thing absolutely impossible and inconceivable.

It does not alter the case in the least degree to say that the will is *self-determined*; that it not only *acts*, but *determines* its own acts; that in choosing it not only fixes upon a particular object, but determines which one shall be fixed upon. The fixing upon the particular one, of course, is in this case an *act* of the will; but the determining which is to be the one fixed upon is certainly not an *act*. Let us for a moment assume it to be an act. We are now obliged to assume it to be an act of a particular character, an

act adapted to produce this particular determination; because the occurrence of the particular determination is accounted for not by the mere fact that an *act* happens, but by the fact that one of a *particular character* happens, viz., one adapted to produce the particular determination. The real determiner must, therefore, be not this determining act, but that something, whatever it may be, which determines the act —gives the act its particular character or determination. The determination is thus due not to the act, but to the determination of the act. It therefore follows that when we speak of an "act of choice," we must mean simply the act of fixing upon some particular thing. The *determining* which one is to be fixed upon cannot be called an act of choice. We may call it choice, but not an act of choice.

Volition.—A double meaning similar to that of "choice" attaches itself to the word Volition. Volition is usually described as the primary *nisus*, or act, of the will, the going forth of the will to effect. It is obvious that this mere effort or *nisus* itself is not determination—the deciding that this effort shall be made, or made as it is rather than otherwise. There is, of course, but one act in the affair, viz., the effort or volition. The determination, which must be prior in the order of nature to the production of effort, is not an act. The cause of the determination may lie in the Ego itself, but this cause never can reveal itself in the consciousness as an act, because it is not an act, and cannot, in the nature of things, be conceived as an act. This distinction between the act of the will and

the determination of the act is recognised even by some of the ablest advocates of a self-determining power in the will. Professor Tappan, for example, in his Treatise on the Will, considers volition to be the primary *nisus*, or act, of the will; and the antecedent something which determines the volition he regards as choice. "Choice and Volition," he says, "are very generally used as synonymous. I conceive, however, a distinction. Volition, or the primary *nisus*, is the first action, or the first going forth of cause to effect. Choice, as used in contradistinction to Volition, precedes the primary *nisus*, and is equivalent to predetermination, or intention" (p. 204, English Edition). Unfortunately, Professor Tappan does not very consistently carry out this view; for, although he here regards volition as being the *first* action of the will, yet he elsewhere speaks of choice as an act. Surely, if choice be an act of the will, it is an act prior to volition, which is here regarded as the first act.

Motive.—But it may be urged that even according to the determinist theory, viz., that the will is always determined by the strongest motive, determination or choice is produced by an act. Motive, it may be asserted, can affect the will in no other way than by acting upon it; so that if determination is produced by motive, it must be produced by the action of the motive. If it be the strongest motive that determines the will, that motive has the mastery simply because it acts more powerfully than the other. In short, if action cannot determine the will, motive cannot, for motive can do it in no other manner.

This objection will, on a little reflection, be seen to be based on the old confusion of ideas about the nature of determination, on the failure to distinguish between the mere cause of an event happening and the cause of its happening thus and not otherwise.

If the motive to go east be the strongest acting on a man's will, then his will will be determined to go east. In this sense determination may be attributed to the action of motive; but this is not determination in the sense in which the term has been used in this discussion, neither is it determination in the sense understood in the free-will controversy, as I have shown elsewhere.[1] Unless the motive to go east had been the strongest motive acting on the will, the man certainly would not have gone east; but that which determined that east should be chosen rather than any of the other possible directions, was not the mere strength of the motive to go east, but those previous circumstances or conditions which led to going east being more agreeable to him than going in any other direction. This is obvious from the very fact that those previous conditions had in reality determined the matter of the man's going east, in place of west or any other direction, before the motive had any existence. *It was the determining which shall be the strongest motive* that was the real determining cause in the whole affair; but this was not anything of the nature of action. The determiner was pre-arrangement, adaptation; not force or strength of motive.

[1] *Philosophy of Theism*, Ward & Co., 1857.

It is, indeed, inconceivable that the mere action or force of the motive should result in determination.

Misconceptions regarding determination do not, however, end here. They enter, as will be shown in the Appendix, in a still more marked form into the further question of free-will; a question which is considered in that place at some length, as it has a most important bearing on evolution in relation to Ethics and Sociology, and also on the whole history of human actions.

The free-will reader need not, however, be deterred in the least by what is stated above in reference to choice and volition from adopting to the full extent the views on Evolution put forth in this volume. All that is here maintained is, that there can be no such thing as free-will based on the idea that choice or determination can be of the nature of an *act*, for such a thing is both absolutely impossible and absolutely inconceivable.

CHAPTER VII

CAUSATION

THE principle of Causality may be expressed thus: "Every event, everything which comes to pass, everything which happens, must have a cause."

This principle is unquestionably a first truth. It cannot be proved to be true. It is self-evident. No amount of reasoning could make it more certain than it is. It is *a priori*; and not derived from experience. Experience could never confer on it necessity and universality. Observation and experience might authorise us to say that every event, so far as known, has had a cause; but it could not afford any warrant for affirming that *every* event *must* have a cause. The principle does not affirm that everything must have had a cause. It simply affirms that everything which *began to be*, or *came to pass* must have had a cause. It is not a thing, merely as an existing thing, but as a thing whose existence has had a beginning that demands a cause. The principle does not apply merely to some particular class or classes of things; for, be the thing what it may, if it has this characteristic, that it *began to be*, or *came to pass*, then it must have had a cause.

And what holds true of the term "thing" (and this

is of great importance in the present inquiry), holds even still more of the term "cause." The principle affirms nothing whatever as to the nature of the operating cause. Reason does not directly give the least insight into the nature of the cause; all that it affirms, in so far as the principle is concerned, is, "that everything which begins to be must have had a something preceding, without which it would not have begun to be." This something, be it what it may, we call the cause. The nature of the cause is in no way affirmed by our principle. What that nature may be in any particular case, whether a force, an act, an effort or anything else, must be found, not by pure Reason, but by other measures. It is not even deducible from the principle. It must be learned from the nature of the effect, the "thing"; that is, the nature of the cause must always agree with the nature of the effect, the "thing" produced.

The overlooking of this important consideration regarding cause, as we shall afterwards see, has been a source of much confusion in discussions on the nature of determination, more especially in reference to that of the will. It is true that any one, for a special purpose, may use the word cause in some particular and restricted sense, defining it, if he chooses, to be a force, an effort, or an exertion of power; but he is not at liberty to use the word in any such sense in the principle of causality. He is not warranted, for example, to affirm that *everything* which happens *must* be produced by a force or an effort. The principle gives him no ground for assuming that *every-*

thing which comes to pass *can* be produced by such a cause, far less for affirming that it must be so produced. The explosion of the gunpowder in a cannon, for example, is the cause of the motion of the ball; but he explosion of the powder, as has been already shown, is not the cause of the ball going in one direction rather than in another. The explosive force of the powder is the cause of the motion, but not the cause of the *determination* of the motion. The determination of the motion is a something which as truly comes to pass as the motion itself; and, according to the principle of causality, it is as impossible for it to come to pass without a cause, as for the motion, action, force, or energy. Action, force or energy is a cause of motion; but it is absolutely impossible in the nature of things that it can be a cause of the determination of motion. And what holds true of the determination of motion holds equally true of determination under every possible form, whether physical, mental or moral. It is just as absolutely impossible, for instance, that "will-*energy*" can be a cause of the determination of human action, as that the energy of the gunpowder can be a cause of the direction given to the ball. The cause of determination is *that something, be it what it may, without which the determination would not be produced.* To illustrate this, suppose a number of objects are placed before an individual for choice, and he selects the one which is most agreeable to him, then I would say that the agreeableness of the object to the individual is that which determines his choice. Or if he selects that which appears the most reasonable, then it is the

reasonableness of the thing which determines his choice. The advocate of a self-determining power in the will would no doubt say that it is not the agreeableness or the reasonableness of the thing which determines the choice, but the will itself which determines itself in accordance with the most agreeable, or in accordance with the most reasonable, as the case may be. Well, assume it to be so. Then there must be something in the will which leads it to choose the most agreeable or the most reasonable. If not, there would be an event without a cause. This something, be it what it may, I would call the cause of the determination. But it has been demonstrated that this cannot be anything of the nature of an act, an effort, or an exertion of power; and this is all for which I am contending at present.

Take another illustration, say that of a cannon-ball moving in an easterly direction. The explosion of the gunpowder is the cause of the motion of the ball, but not, as we have repeatedly seen, the cause of the determination of the motion—the direction taken by the ball. The ball moved east rather than west, or in any other direction, simply because the cannon at the time of the explosion happened to be pointing east rather than in any other direction. This I call the cause of the ball taking the easterly direction, or, in other words, that which determines the motion. In most cases the cause of the determination of motion is some pre-arrangement or pre-adjustment in relation to space and time. But in no case can it ever be anything of the nature of an act or exertion of force.

Everything which comes to pass must have not merely a cause, but a cause capable of bringing it to pass: otherwise it would not come to pass. There are whole classes of events for the production of which force or energy has no adaptation, so that it could not in the nature of things be their cause.

Supposed exceptions to the Principle of Causality.— Mr. J. S. Mill, referring to the principle of causality,[1] says: "Now, as to real necessity, we do not know that it exists in the case. Sir W. Hamilton himself is of opinion that it does not, and that there are phenomena (the volitions of rational intelligences) which do not depend on causes." In his Logic[2] he says: "Finally there is one class of phenomena which, even in our day, at least one-half of the speculative world do not admit to be governed by causes. I mean human volitions. These are believed by the metaphysicians who espouse the free-will doctrine, to be self-determined, self-*caused*; that is, not caused by anything external to themselves, not determined by any prior fact." The same opinion is affirmed by Mr. G. H. Lewes: "To leave ordinary men, and to confine ourselves to philosophers; amongst them we shall find that, with respect to one class of phenomena more than one-half of the thinking world is firmly convinced that every effect does not imply a cause: the class o phenomena referred to, are those of human volitions. All those who espouse the doctrine of freedom of will, declare that all our volitions are self-*caused*."[3]

[1] *Examination of Sir W. Hamilton's Philosophy*, p. 229.
[2] Vol. ii. p. 110. [3] *Biographical History of Philosophy*, iv. 49.

Here it is affirmed that one-half of the speculative world holds that volitions are self-determined, self-caused. So far from this being the case, there are probably scarcely a dozen of intelligent free-willers to be found holding such an opinion. Free-willers maintain that volitions are acts of the will, and that it is the will which determines them. But even supposing they held the notion that volitions cause themselves, this would not prove that they believed that events happen without causes, but the reverse. It would prove that, rather than believe that volitions could happen without a cause, they believed that they caused themselves. It may be true that prevailing theories regarding free-will logically imply the absurdity of an event without a cause; but free-willers do not admit this. No free-willer could, with consistency, hold the opinion that volitions are produced without causes. The free-willer maintains that unless he himself be the cause of his volitions he cannot be responsible for them. He maintains that he cannot be either praised or blamed for volitions which he neither produced nor could have prevented. But a volition which would arise without a cause is an event as much beyond his control as one which might be the result of an absolute necessity.

It is true that we have in Kantianism something like an exception to the principle of causality. According to Kant, Space and Time are not modes pertaining to the existence of things in themselves, they are but the subjective forms of our sensuous intuitions—the conditions of things as phenomena. Apart from our

subjectivity, everything which we discover in space and time, and even space and time themselves, have no existence. Kant affirms that "everything which comes to pass must have a cause," but "coming to pass," being a time-condition, can apply only to phenomena, and has no meaning whatever in reference to things in themselves, which, according to his theory, are, of course, not in space and time. The matter of our sensations, the supersensuous substratum of nature, or that something by which we are affected, and the I, or self, the subject of these sensations, being noumena, not phenomena, are not in space and time; and consequently the law of causality has no application to them. On this Kant founds his theory of Freedom. But Kant cannot establish his doctrine without considering the noumenal self as a cause. The Noumenal Ego stands related to a series or chain of phenomena as their origin: hence it must be viewed in a twofold aspect. Viewing it as the originator of the series of phenomena, we find that something begins to be; and in this regard the Ego may be said to be sensuous and under the necessity of nature. But in regard to its *action*—the transcendental ground or foundation of this effect—it is according to Kant intelligible; and its action as that of an "intelligible cause," as noumenal, does not begin to be, is not under the conditions of space and time, and therefore not under the necessary law of causality. In short, before phenomena or experience becomes possible, there must, according to Kant, be a reciprocal causal connection between the supersensuous substratum of matter and the nou-

menal subject. The synthesis of intuitions, as Professor Adamson remarks,[1] which we call object, must have a transcendental ground which determines it as empirical representation. The phenomenal world is merely the manifestation in the forms of experience of the noumenal world; and this latter, being beyond space and time, is not determined by the natural law of causality, but in its causality is subject only to the law of pure intelligence.

Cause and Conditions.—The distinction between cause and conditions is to a great extent arbitrary. There is no real or essential distinction between the two. We generally select the antecedent agent by which the effect is mainly brought about and term it the *cause*: the others we designate the *conditions*. This arrangement, however, is merely one of convenience: it sometimes helps to prevent confusion. But all the conditions are co-operating causes; and the selected one, which we term the cause, is effective only in co-operation with the others. The cause of an event is in reality, as Mr. Mill expresses it, "the sum total of the conditions positive and negative taken together; the whole of the contingencies of every description, which, being realised, the effect invariably follows." This is evident from the fact that if any of those conditions were wanting, or were different from what it is, the effect produced would also be in some respect different from what it is. Were the absence of a condition not to produce any change in the effect, we should deny that it had been one of the conditions

[1] *Philosophy of Kant*, p. 95.

of the operation, simply because to restore it would produce no *effect* on the result. This shows that we do actually regard the conditions as causes.

This plurality of causes, or identity of cause and conditions, is now accepted by advocates of the intuitional or *a priori* theory of causation, as well as by those of the empirical school. In fact it is the only view logically consistent with that theory; for, as we shall shortly see, unless conditions are causes it will not hold true that "everything which comes to pass must have a cause." But, as already stated, it is convenient to select the principal agent in the group, to call it the *cause* of the change and the others the *conditions*.

CHAPTER VIII

CAUSATION (*continued*)

Uniformity of Causation.—Second in importance to the great principle "every event must have a cause," is the subordinate one, viz., "the same cause acting under the same conditions will always produce the same effect." Like the great principle itself this is a necessary truth; not, however, primitive but derived. It is obviously deducible from the first: for, if the same cause acting under absolutely the same conditions did not always produce the same effect, but sometimes one effect and sometimes another, then we should have something, *i.e.*, the change from one effect to another, produced without a cause.

This principle is, however, utterly denied by the advocates of a particular view of the doctrine of Free-will. According to them the will is the cause of choice. To-day it chooses A, we shall suppose; but under absolutely the same conditions it might have chosen B. In other words, the same cause (will), acting under absolutely the same conditions, may choose either A or B; and this, it is maintained, is a violation of the principle. Such, however, is not necessarily

the case; for, while all the conditions *external* to the will may be absolutely the same, the cause of the difference in result may be found in a difference of *internal* conditions.

If we suppose everything external to the will to be the same and the will itself in the same state in every respect when it chose B as it was when it chose A, then the difference in choice is absolutely unaccountable. By hypothesis there is nothing within the will, and there is nothing outside of it to produce the difference of result; in short, we have something brought about without a cause. If on the other hand it be admitted that the will was not in the same state when it chose B as it was when A was chosen, then we have not the same but a different cause. The will in one state is not the same cause as the will in a different state. All things external to the will remaining the same, the will in a certain state, say *a*, will choose A, and A only; while if its state be changed to *b*, *c*, &c., it will then choose B, C or something else. *Different causes acting under the same conditions necessarily produce different effects;* but universally the same cause acting under the same conditions, external and internal, must always produce the same effect. Thus no event which ever happened in any sphere or being could possibly have happened otherwise than it did without some change in its antecedents.

The advocates of Free-will who oppose the principle of uniformity in causation attempt to establish their position, so manifestly opposed to reason, by an appeal to the testimony of consciousness. Such an appeal

is not likely to prove successful: for, if consciousness be found to contradict a primary dictate of pure reason, or a necessary deduction therefrom, it will be convicted of contradicting itself. In this case consciousness will no longer be worthy of our confidence, and we shall be landed in universal scepticism.

The testimony of consciousness in relation to freedom, has, however, so important a bearing on questions which will afterwards arise that I shall be obliged to enter into the subject at some length; but this must be deferred till we come to the consideration of certain misapprehensions regarding the nature of determination.

A misleading idea in reference to Cause.—A cause must in the order of nature be antecedent to the effect: this is a necessity both of thought and of things. But mere antecedence and sequence, though invariable, do not constitute cause and effect. The antecedent must produce the sequent, and the sequent so produced must, of course, be an *event*—a *change* of some kind or other—a something *coming to pass*.

There is a theory of causation, formerly generally held, which still prevails to a very considerable extent. The theory is, that between the visible antecedent and the visible sequent, there is invariably an invisible something, a *nexus* connecting the two, and that the change or visible effect is the result not of the visible antecedent, but of the *nexus*. This *nexus* is supposed to be the true cause of the effect. Now, there can be no doubt that in many cases of physical causation this invisible *nexus* is a reality. If, for instance, we hold

a magnetic bar of steel over iron filings, the filings will be attracted towards the bar: but the bar is not the immediate cause of the motion of the filings. The filings are moved, not by the bar but by the unseen something called the magnetic power of the bar. In physical causation the direct and immediate cause of the changes which take place is most frequently, not the visible antecedent but some force, power, or energy belonging to it.

The mistake to which I refer consists neither in supposing the existence of a causal nexus between one event and another, nor in supposing the link to be invisible: but in assuming that the nexus alone is the cause. Everything which comes to pass must have a cause: but we cannot say that everything which comes to pass must be brought to pass by means of this nexus. This nexus possesses neither necessity nor universality. It can be regarded merely as a certain form of cause. A cause must, of course, be capable of producing its effect: otherwise the effect would not be produced: it must have the necessary adaptation and fitness to bring the effect to pass. But it is only a particular class of effects that this nexus is capable of producing. For other classes of effects it can have no adaptation or fitness whatever.

The idea involved in the theory, is that nothing can be a cause unless it is of the nature of an effort, a power, a force, or an energy. But at least one-half of all that comes to pass, cannot in the nature of things be the result of action, effort, power, or force. For example, the determination of motion is as much

an event—a thing which happens, comes to pass, as the motion itself. And the one requires to be accounted for as truly as the other. The particular direction taken by the cannon-ball is as much an event as the motion of the ball itself; and the one event could no more happen without a cause than the other. But it has already been demonstrated in Chap. III. that force, or effort, or anything of the nature of action can never be the cause of the determination of motion. And what holds true of the determination of motion holds equally true of every possible form of determination whether physical, mental, or moral.

In every action which takes place, or which can possibly take place, there are two things which require to be accounted for: viz., the *production* of the act, and its *determination*. There are, therefore, two sets of causes. Power, under some form or other, is always the cause of motion or action; but power can under no possible form be the cause of the determination of action. But it will be asked how can a cause produce its effect unless it has the "power" to do so? The answer to this question will depend upon the meaning which we attach to the word power. If by power we mean ability, fitness, and adaptation, then it is certainly true that *without* power it would be impossible for a cause to produce its effect. But, if by power we mean anything of the nature of energy, force, or effort —and this is the ordinary sense of the term—then it would be equally impossible that *with* this quality a cause could produce its effect, if determination is the effect. Power would be powerless for such an effect.

It will not do to say that nothing can properly be called a cause but that which possesses force or energy. This is simply begging the question. The true and proper meaning of the term cause must be determined by the principle of causality. And the only definition of cause which will suit the principle is this; viz., *that something without which the event would not happen.* Nothing more than this can be asserted of *everything* which is a cause.

The supposed Identity of Cause and Effect.—The identity of cause and effect has been strongly urged by Mr. G. H. Lewes. His views on the point, briefly stated in his own words, are as follows:—"All the vexed questions which have been raised respecting causation turn on the illusory separation of process and product, cause and effect, which is properly a distinction of aspects, not a separation of reals; the antecedent is not one thing, and the consequent another different thing, following it, flowing from it, originated by it, as the offspring from its parents. An effect is the procession of its cause—or, more rigorously, the coalescence of its co-operant conditions" . . . "Mere antecedence never suffices; nor even invariableness of antecedence, unless that invariableness means a *procession*: the antecedent must *enter into* and become *incorporated* in the consequent, otherwise we ought not to call it a cause."[1]

These views of causation follow as a consequence from that peculiar theory which he advocates. If there is nothing but what can be seen and felt—if

[1] *Problems of Life and Mind*, vol. ii., prob. v., chap. ii.

this comprehends all that is, then a mere statement of the seen and felt will explain everything. There can be then no metaphysics: and if there were, it could be of no service, as it would have absolutely nothing to explain. If, however, the felt be not absolute, but merely a manifestation, or an effect of an unseen reality; then a cause must frequently be very different from its effect, and incapable of entering into and becoming incorporated so as to be identical with it.

The distinction between cause and effect is very marked. The cause must always *precede* the effect: further the cause must *produce* the effect—give it existence. It is true that cause and effect, viewed under a certain aspect, may be regarded as identical. All nature is a process. Events succeed each other in one continuous chain. One change produces another. What is now an effect becomes often at the next moment a cause, resulting in another effect, which in turn becomes a cause, giving rise to still another effect, and so on in like manner in continuous succession. In fact, the greater part of all the effects which take place become in turn causes. It is difficult to produce a change of any kind which does not in turn produce another change, and this other another still, and so on. A change is generally an effect in relation to what precedes, and a cause in relation to what succeeds.

This has been very clearly stated by Schopenhauer, who states that, "when several real objects pass into any new state, some other state must have preceded this one, upon which the new state regularly follows,

i.e., as often as that preceding one occurs. This sort of following we call *resulting*; the first of the states being called a *cause*, the second an *effect*." . . . "The law of causality stands in exclusive relation to *changes*, and has to do with them alone. Every effect, at the time it takes place, is a *change*, and, precisely by not having occurred sooner, infallibly indicates some other *change* by which it has been preceded. That other *change* takes the name of *cause*, when referred to the following one, and *effect* when referred to a third necessarily preceding change. This is the chain of causality."[1] In short, history consists in the causal connection of events. In the eloquent language of Dr. Chalmers, "A word—a thought—a trifle—may generate an influence wide as a continent, and lasting as a thousand years."

Persistence of Force in relation to Causation.—An attempt has been made by some of the advocates of Mr. Spencer's theory to substitute the persistence of force for the great principle of causality. To say, it is asserted, that the same cause acting under the same conditions will always produce the same effect is virtually to say that force is persistent. For it is because force persists that similar antecedents invariably determine similar consequences. A more obvious mistake could not be committed than to confound the principle of causality with Mr. Spencer's principle of the persistence of force. Nothing could be further from the truth than to conclude that were force not persistent, the same cause would not produce the same effect.

[1] *Fourfold Root*, p. 38.

The principle that the same cause will always produce the same effect is utterly independent of the way in which force may behave. Suppose a stone descending a given distance should perform, say, ten foot-pounds of work the one day, but in consequence of force ceasing to be persistent, it should perform only five foot-pounds of work the next day, it would still remain true that the same cause must produce the same effect; for the acting stone was not the same cause on the second day as it was on the first; the difference of effect being due to the difference of causation.

But these writers, in substituting the persistence of force for the principle of causality, evidently misapprehend the latter principle. The principle that the same cause will always produce the same effect is not the great principle of causality, but rather, as has already been shown, a deduction from that principle. The principle of causality is that "Every effect, everything that happens or comes to pass, must have a cause"—a principle wholly independent of the persistence of force, which would be necessarily and universally true, although force never had been persistent.

To the foregoing the following objection has been urged. "The essential element in the idea of causation consists in that of *equivalency*; not only must it be true that everything which happens must have a cause, but also that like causes should always produce like effects, or that there should invariably be a quantitative relation between the cause and the effect.

But this would not be the case, if, according to the above illustration, a falling mass produced a different amount of mechanical effect on different days—*i.e.*, there would be no causation in such a case; for there would not be such a collocation of conditions as invariably produced a particular consequent. Which is another way of saying that if force were not persistent, causation would not be existent."

To this objection I reply that the relation of equivalence between cause and effect is absolutely independent of the persistence of force, and would remain though force were as variable as the winds. To affirm that a cause must always be equivalent to the effect which it produces is simply to state a proposition logically deducible from the principle of causality. For if there should be something more in the effect than could have been produced by the cause, then this something must either be an effect without a cause or the effect of some other cause. If we suppose the former, then we contradict the principle of causality. If we suppose the latter, viz., that this something was the effect of some other cause, then it follows that the cause in question was equal to all it actually produced.

Take the case of the stone in the foregoing illustration. Suppose we found that the stone in descending a given distance performed ten foot-pounds of work one day, but only five the next. According to the principle of causality there must have been a cause for the disappearance of the five foot-pounds.

Either the stone must have lost half of its weight, or the five missing foot-pounds must have gone to produce heat or some other sort of work. Assume the former to be the true explanation. The principle of causality simply affirms that there must have been a cause for the loss of weight, or, in other words, *for force ceasing to be persistent.* This does not in any way affect the principle, which holds good whether force persists or not. It only guarantees that the force could not cease to persist without a cause. The domain of causality is far wider than that of force. Countless millions of effects are continually taking place that have no relation to force, as for example determination; and for this reason among others the persistence of force could not be substituted for the principle of causality.

In almost every case the conclusions which Mr. Spencer draws from the persistence of force appear to be but the simple and necessary deductions from the general principle that "the same cause acting under the same conditions will always produce the same effect." It may be true that the conclusions which he draws are correct; but they are so solely in virtue of this principle. His conclusions when properly analysed amount merely to this: the same force acting under exactly the same conditions always produces the same effect. But the *same force* acting under the same conditions always produces the same effect, simply because every cause, be it what it may, acting under the same conditions, must always produce the same effect. And this again is necessarily true, because it is a

logical deduction from that still more general principle, "every effect must have a cause."

The principle of causality is of far greater importance and generality than that of the persistence of force. Even within the sphere of mechanics, the science of force, the principle is of more general application than that of the persistence of force. Take, as an example, a case which may help to illustrate this difference, the First Law of Motion; viz., "A body always perseveres in its state of rest, or of uniform motion in a right line, till by some external influence it is made to change its state." This law follows as a necessary consequence from the principle of causality; but it is not deducible from the persistence of force. Of course, if force did not persist, the law would not hold true; but nevertheless its truth is not *a priori* deducible from that principle. The persistence of force will guarantee that the motion of the body will remain uniform; but it will not guarantee that it will keep the straight line. The principle of causality, however, guarantees both; for, without a cause, it is absolutely impossible that the body can change either its *rate* of motion or the *direction* of its motion. The mere *absence* of a cause to turn the body aside, will make us more certain that it will keep the straight line, than if it were hemmed in on every side by walls of adamant.

The difference between the generality of the two principles is very marked, and the reason of this is obvious. Force from its very nature cannot possibly take into account determination, which is, of course,

the most important element in almost all questions. The *conditions* under which force may act will sometimes do so, but not force itself; but the principle of causality embraces every department. It is all-comprehending.

CHAPTER IX

THE CAUSE OF DETERMINATION

I TRUST that the foregoing discussions will now have made it evident that it is not only impossible that determination can be produced by anything of the nature of *action*, *force*, or *motion*, but that this impossibility is absolute.

What then is the cause of determination? The immediate cause of determination is unquestionably the pre-arrangement or pre-adjustment of the antecedent conditions.[1] The cause, for example, which determined the cannon-ball to move, say, east rather than west or any other direction, was not, as already pointed out, the explosive force of the gunpowder, but the fact that at the time of the explosion the cannon was pointing east rather than west or in any other direction. And what holds true of the cannon-ball holds true of motion under every possible condition. The determinate direction of the motion and the determinate time it took place depend always upon the particular determination of the immediate antecedent conditions. The determined condition of anything

[1] The term "cause" is here of course used in the sense explained in the chapter on Causation.

depends upon the determined condition out of which it arose. In other words, the determination of a thing is the result of the determination of the antecedent, and the determination of the antecedent is again the result of the determination of its antecedent, and so on back in like manner.

A change is always produced by a change, an act by a preceding act, and this preceding act by one still prior, and so on in like manner. But a change or an act must always happen in some determinate manner in regard to time, place, and other circumstances. Now although the act is produced by the antecedent act, the determined manner in which the act occurs is not produced by the antecedent act. It is produced, as has already been shown, not by the antecedent act but by the *determination* of the antecedent act. And in like manner the determination of the antecedent act is produced not by the act prior to it, but by the determination of the prior act.

The determination of any force depends on the preceding distribution of forces in their amount and direction, and this distribution depends in turn upon a preceding distribution, and so on through past ages. But, it must be observed, that the distribution of the forces as to amount and direction can in no conceivable way be due to the action of force, but must always be due to the *determined* manner in which the action takes place. In other words, it is due not to force but to the determination of force. Action is always produced by action, but determination is produced by determination, and determination only. The

determined manner in which every event happens is determined not by the action of the cause which produced the event, but by the determined way in which the cause acted. No event could have happened differently unless the cause which produced it had acted differently.

The state of the universe at any moment was inevitably determined by its state the moment before. And this principle must have held necessarily true during all past time. To suppose a violation of this principle would imply an event without a cause, a thing impossible. The evolution of the universe may be regarded as consisting of a double process. The one, the production of change or events; the other, their determination. The two processes are inseparably connected, for a change cannot possibly take place without, at the same time, taking place in some *determinate* manner. In the one chain we have change producing change; in the other, we have determination producing determination. Another point is that the one process can never pass into the other. Action, motion, or change can never produce determination, nor determination produce action or motion. The two processes stretch indefinitely back into the past eternity. They are also continuous; cause passing insensibly into effect.

If cause and effect in both processes are thus necessarily connected, then it would seem to follow that nothing could have happened otherwise than the way in which it actually happened unless the first determination had been different.

CHAPTER X

DETERMINISM IN RELATION TO SPENCERIANISM

EVOLUTION consists, as we have seen, of two grand factors, (1) Mind, Matter, Motion and Force, and (2) the Determination of Mind, Matter, Motion and Force. These two factors, as has also been shown, although invariably conjoined, are nevertheless absolutely distinct in their essential nature. Of these two, the latter is by far the more important; for it is with it that the process of evolution is mainly concerned.

As the two factors run parallel to each other, I think it will be better to call the one the Right and the other the Left factor, in preference to the first and second. And as Determination is the more important of the two, I shall call it the Right factor; while Mind, Matter, Motion and Force, I shall call the Left factor.

Before proceeding to the consideration of what seems to be the bearing which these factors have on the explanation of the process of evolution, it will be of service to examine in the first place, one or two of the leading theories which have been advanced regarding the more general and fundamental principles of

Evolution. The ignoring or overlooking of the importance of the Right factor, as I had occasion to mention in the first chapter, has been the fundamental defect of most theories.

I shall now select Mr. Herbert Spencer's theory as giving by far the most complete exposition of the Left factor.

The radical defect in Mr. Spencer's theory, as we shall see, is that it attempts to explain evolution by means of the Left factor without duly recognising the Right or more important one.

The Universe is supposed by Mr. Spencer to be the conditioned manifestation of an Absolute Power; a power utterly unknowable to us; an Unconditioned Reality, without beginning or end. There is thus in Mr. Spencer's system an Absolute behind phenomena; an Actuality lying behind appearances.

According to Mr. Spencer all scientific conceptions such as Matter, Motion and Force, Time and Space, rest ultimately on the insoluble. They are all representative of realities that cannot be comprehended. Force he regards as the ultimate of ultimates; "for although Space, Time, Matter and Motion, are apparently all necessary data of intelligence, yet a psychological analysis," he says, "shows that these are either built up, or abstracted from experiences of Force."[1] Matter and Motion, as we know them, are differently conditioned manifestations of Force. "All other modes of consciousness are derivable from experiences of Force; but experiences of Force are not derivable

[1] *First Principles*, § 50.

from anything else" (§ 50).[1] Force, as we experience it, he regards as a certain conditioned effect of the Unconditioned Cause—as the relative reality indicating to us an Absolute Reality by which it is immediately produced.

Persistence of Force.—The Persistence of Force is Mr. Spencer's fundamental principle, in fact the very keystone of his system. The force of which Mr. Spencer asserts persistence is the Absolute Force of which we are indefinitely conscious as the necessary correlate of the force we know.

"The sole truth," says Mr. Spencer, "which transcends experience by underlying it, is the Persistence of Force. This, being the basis of experience, must be the basis of any scientific organisation of experiences. To this an ultimate analysis brings down; and on this a rational synthesis must build up."[2]

Will this principle of Mr. Spencer account for evolution? Can a rational explanation of evolution be derived from it? "Evolution," says Mr. Spencer, "is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent homogeneity, to a definite coherent heterogeneity, and during which the retained motion undergoes a parallel transformation" (§ 145).

This, I presume, is an accurate statement of what

[1] This is certainly not the case, for our very idea of force is derived from the conscious effort of our wills. Without this we could have no "experiences of force." Force, therefore, so far as psychological analysis is concerned, cannot be the ultimate of ultimates. This is a point, however, which does not necessarily concern our argument.

[2] *First Principles*, § 62.

evolution *actually is*. The question now to be considered is: Will Mr. Spencer's great principle explain *how* this process is brought about?

This same question is asked by Mr. Spencer himself. In his introduction to the chapter on "The Interpretation of Evolution," he asks, "Is it possible for us to ascertain *why* such is the course of transformation? May we seek for some all-pervading principle which underlies this all-pervading process? Can the inductions set forth in the preceding four chapters be reduced to deductions?" "Unless we succeed," he adds, "in finding a *rationale* of this universal metamorphosis, we obviously fall short of that completely unified knowledge constituting Philosophy."

"The task before us, then," continues Mr. Spencer, "is that of exhibiting the phenomena of Evolution in synthetic order. Setting out from an established ultimate principle, it has to be shown that the course of transformation among all kinds of existences, cannot but be that which we have seen it to be. It has to be shown that the redistribution of matter and motion must everywhere take place in those ways, and produce those traits, which celestial bodies, organisms, societies, alike display. And it has to be shown that this universality of process results from the same necessity which determines each simplest movement around us, down to the accelerated fall of a stone or the recurrent beat of a harp-string. In other words, the phenomena of Evolution have to be deduced from the Persistence of Force. As before said —' to this an ultimate analysis brings us down; and

on this a rational synthesis must build up.' This being the ultimate truth which transcends experience by underlying it, so furnishing a common basis on which the widest generalisations stand, these widest generalisations are to be unified by referring them to this common basis" (§ 147).[1]

I shall now consider at some length the grounds upon which Mr. Spencer thus concludes that the law of evolution is deducible from the persistence of force. The factors of this law he has discussed separately in Chapters VIII., IX., and X. of his "First Principles." They are Transformation and Equivalence of Forces; motion follows the line of least resistance, and motion is universally rhythmic. Then in Chapters XIX., XX.,

[1] It is utterly inexplicable how this doctrine of Mr. Spencer should have been deduced by so many writers, with perfect confidence, as accounting for the whole process of nature. The author of "A Candid Examination of Theism" (*Eng. and For. Phil. Lib.*, vol. ix.), for instance, says: "It manifestly follows that all the varied phenomena of the universe not only may, but must, depend upon the *persistence of force* and the primary qualities of matter" (p. 63). "It does not admit of one moment's questioning that it is as certainly true that all the exquisite beauty and melodious harmony of nature, follow as necessarily and as inevitably from the *persistence of force* and the *primary qualities* of matter, as it is certainly true that force is persistent, or that matter is extended and impenetrable" (p. 63). Again, "the whole system of general laws must be, so far as the lights of our science can penetrate, the necessary outcome of the *persistence of force* and the *indestructibility of matter*" (p. 79). And again, "In these previous chapters the proposition was clearly established that, just as certainly as the fundamental data of science are true, so certainly is it true that the theory of Theism in any shape is, scientifically considered, superfluous; for these chapters have clearly shown that, if there is a God, his existence, considered as a cause of things, is as *certainly unnecessary as it is certainly true that force is persistent and that matter is indestructible*" (p. 72). The italics are mine.

and XXI. he considers the factors in their combined action so as to "affiliate the universal traits of evolution by showing that, given the persistence of force, the redistribution of matter and motion necessarily proceeds in such a way as to produce them." In their combined form they are "the Instability of the Homogeneous;" "the Multiplication of Effects;" and "Segregation."

It seems to me that Mr. Spencer has got on an entirely wrong path. He appears never fully to have realised the great truth that evolution is the result not of force but of the way in which force is *determined*: and that, so far as the process of evolution is concerned, force explains nothing; determination everything. Force cannot determine force, neither can it afford any insight into how these determinations are brought about. It will not help the matter in the least degree to say that the force "persists," for if it be absolutely impossible that force can determine anything, its mere persistence will not enable it to do so.

Transformation and Equivalence of Forces.—If it is laid down as a truth which holds absolutely that the total amount of energy in the universe remains the same, and that it can neither be increased nor diminished; and that when any portion of it disappears in one form an equivalent amount necessarily reappears under some other form, then it is almost a truism to assert that the Equivalence of Force necessarily follows from the principle of the Persistence of Force.

On this point we need not further dwell. The question we have now to consider is this: Does the

persistence of force afford any explanation of the cause of the transformations of force? Is the transformation of force deducible from the persistence of force? Certainly not. The transformation of force results not from force itself, but from the way in which the force is determined. For the character of any form of energy or force is due entirely to its determinations. It is probable that *all the Energies and Forces of Nature are the same in their essential nature, and differ only in their Determinations.* Two substances, say oxygen and hydrogen, are combined chemically; heat is evolved as a consequence. The energy in the form of heat is derived from the energy in the form of chemical combination. The energy which disappears in chemical combination now transformed reappears as heat. We have first chemical energy and then heat; not first annihilation of chemical energy and then creation of heat. The energy which now appears as heat is the selfsame energy which previously existed as chemical energy. The energy has only changed its form, and nothing more—assumed a new determination.

Suppose the heat to be applied to move a machine and to perform mechanical work. What appears as mechanical energy (mechanical motion) disappears as heat; and the energy stored up potentially as work performed, say, in the raising of a weight, is the selfsame energy which previously existed as chemical energy and then as heat. The same holds true whatever may be the number of the transformations. Chemical combination will produce an

electric current; the electric current will produce magnetism; and the magnetism will produce motion in a machine; and the machine will generate heat or perform work. Here we have the energy assuming in succession five or six different forms. While the particles are combining we call the energy chemical; when the electric current is produced the energy is named electrical; when magnetism is produced we designate it magnetic; and when the machine is in motion we call it mechanical; and so forth. It is the same energy under all these various forms. The only difference between chemical, electric, magnetic, and heat energy is merely in the mode of operation. The difference lies, therefore, not in the force or energy itself, but in its *determinations*. If we regard heat, light, electricity, magnetism, chemical action, &c., as but different modes of motion, as they in reality probably are, then the difference between chemical action and heat, or between heat and electricity, or between electricity and magnetism, or between magnetism and mechanical motion, &c., depends wholly on the *cause of the determination of motion*. The difference does not lie in the mere exertion of force, but in the *way* or *manner* in which force is exerted.

The whole question is, therefore, one regarding the determination of force. But the determinations of force, as has been shown, are absolutely unexplainable by force itself. Force can give no light. You must go beyond it for the light. All that you can obtain from force is motion or energy; nothing more.

And nothing is gained by merely adding the conception of the persistence.

It is, of course, true that Mr. Spencer gives us a most abundant account of the transformations of force from one form to another in almost every department of science. But he can only do this truly by forsaking the Left factor and going over to the Right. The new determinations of force constituting these transformations are absolutely unexplainable by any other means. They are not deducible either from force or the persistence of force or anything pertaining to the Left factor.

The Direction of Motion.—"Where attractive forces," says Mr. Spencer, "alone are concerned, or rather are alone appreciable, movement takes place in the direction of their resultant; which may, in a sense, be called the line of greatest traction. Where repulsive forces alone are concerned, or rather are alone appreciable, movement takes place along their resultant; which is usually known as the line of least resistance. And where both attractive and repulsive forces are concerned, or are appreciable, movement takes place along the resultant of all the tractions and resistances. Strictly speaking, this last is the sole law; since, by the hypothesis, both forces are everywhere in action" (§ 75).

And now of the general truth set forth in these chapters, Mr. Spencer asks (§ 81): "What is our ultimate evidence? Must we accept it simply as an empirical generalisation? Or may it be established

as a corollary from a still deeper truth? The reader will anticipate the answer. We shall find it deducible from that datum of consciousness which underlies all science."

"Suppose several tractive forces, variously directed, to be acting on a given body. By what is known among mathematicians as the composition of forces, there may be found for any two of these, a single force of such amount and direction as to produce on the body an exactly equal effect." He then refers for illustration to the parallelogram of forces, the diagonal of which represents the amount and direction of a force that is equivalent to the two component forces.

This, in fact, appears to be about all that is really logically deducible from the principle of the persistence of force. The chapter, it is true, is full of most interesting details of results which necessarily follow from the direction taken by the forces, but not one of them appears to be deducible either from force or the persistence of force. They are all results not of force, but of the determinations of force.

It is perfectly true, as Mr. Spencer states, that to deny that motion will take place along the line of greatest traction or along the line of least resistance would involve a denial of the persistence of force. This is what no one will deny. But the question really is, Are the various conclusions in this chapter really deducible from the persistence of force? Certainly not; for the determinations of force are not deducible from force. They cannot be explained

either by force or the persistence of force. All that force can account for is the mere motion or energy in the affair. In order to make this point more clear in reference to the present case, I cannot do better than quote here a paragraph from a former chapter in regard to the parallelogram of forces.

"I have been asked in reference to the parallelogram of forces, Is not the determination of the resultant force, in magnitude and direction, effected by the magnitude and direction of the components. The reply is, Certainly; the determination is effected by the *magnitude* and *direction* of the component forces. But this is simply saying that the determination is effected, not by the forces but by the determination of the forces. *Magnitude* and *direction* are not forces, but certain determinations of the forces. Magnitude is the *determined quantity*; direction the *determined path* taken by the forces. Consequently it is the determinations of the component forces, not the forces themselves, that determine the resultant force.

Take another case. Is not each swing of a pendulum, it has been asked, determined by force; for is it not determined by the previous swing *plus* gravity; and hence and only hence is it not that the course and the amplitude of the next swing admit of being calculated or predicted? The mere motion of the pendulum is, of course, effected by the *force* of gravity, but the direction of that motion is not the result of motion but of the *direction* in which the force acts. When the pendulum swinging to the east, for example,

reaches the extremity of its swing, gravity acts in the direction so as to make it swing to the west; and when it reaches its western extremity, the direction of the action of gravity is reversed, and it again swings to the east, and so on. The swing is therefore determined, not by the force of gravity, but by the *way* in which the force acts. In other words, it is due, not to *force*, but to the *determination* of the force. Again, the *determined magnitude* of the swing is the result, not of force, but of the *determined magnitude* of the force.

Mr. Spencer agrees with Mr. Hinton that organic growth takes place in the direction of least resistance. It may be true that in organic nature motion takes place along the lines of least resistance. But what determines the lines of least resistance in relation to the organism? If a tree is to be formed, the lines of least resistance must be all determined and adjusted in relation to the objective idea of the tree; of the root; of the branches; of the leaves; of the bud; of the fruit; and of every part of the tree. But this is not all: the tree is built up molecule by molecule, each of which requires a special determination, and, beyond all this, we have the structureless protoplasm, which must be differentiated according to the objective idea of the whole. What produces this marvellous adjustment of means to ends? Will Mr. Spencer's simple mechanical principles do this? Certainly not. It is true that behind the relative force there is the absolute force. But this absolute force in its essential

nature can have no adaptation for such work. This absolute force of Mr. Spencer in this respect differs not from Schopenhauer's unconscious will, which according to Schopenhauer's own admission is but another name for a blind, absolute force.

CHAPTER XI

DETERMINISM IN RELATION TO SPENCERIANISM (*continued*)

The Instability of the Homogeneous.—There seems very little relating to the Instability of the Homogeneous which is either explainable or deducible from the persistence of force. All or nearly all the phenomena relate, not to force, but to the determinations of force, a point on which neither force nor the persistence of force casts a single ray. Take one case as an illustration. The several parts of any homogeneous aggregate, for example, are necessarily exposed to forces differing both in kind and in amount, and they are of necessity differently modified. The relation of outside and inside to neighbouring forces, for instance, implies the reception of influences that are unlike in quantity, or quality, or both; and it follows that unlike changes will be produced in the parts thus dissimilarly acted upon. Here everything relates to determination. There are the *separate* parts of the aggregate. The separate parts are exposed to forces *differently determined* both in *kind* and in *amount*. The outside is in a differently *determined* condition from the inside; and this determines that the results shall be different in

quantity and perhaps also in *quality*. Mere persistenc of force explains none of these peculiarities. They are explained only by referring them to prior conditions or determinations. But it must be obvious that the heterogeneity thus resulting from the inequality in the forces applied to the various parts of an aggregate cannot possibly be the heterogeneity of evolution. It must be the heterogeneity not of evolution, but of dissolution; not of order but of confusion.

A blow from a hammer will shiver a stone into fragments and scatter these fragments in all directions. This is about all that force can do. If there is a special end to be gained by the blow, the blow must be specially directed in relation to that end, but this is what cannot be effected by force. Force can impart the blow, but it cannot direct it.

The heterogeneity of evolution, according to Mr. Spencer, is a change from *indefinite* homogeneity to *definite* heterogeneity, where increasing multiformity is always joined to increasing definiteness. But more than this, the change from the indefinite to the definite is also a change from the *incoherent* to the *coherent*, and always resulting in a process of integration. It is obvious that this change from the indefinite to the definite, from the incoherent to the coherent, is effected, not by force, but by the way in which the force is directed; not by force but by the *determination* of force; and this determination, as we have abundantly demonstrated, cannot be effected by force. Consequently, evolution, in so far as it is a change from the homogeneous to the heterogeneous, is not the result of

force, as Mr. Spencer's theory supposes. "This principle," as he himself admits, "supplies no key to the detailed phenomena of organic development. It fails entirely to explain generic and specific peculiarities, and we have no alternative but to fall back upon the unexplained principle of hereditary transmission" (§ 152).

The Multiplication of Effects. — The same conclusions which have been deduced in reference to the Instability of the Homogeneous hold equally true in reference to the Multiplication of Effects. The only essential difference between the two cases is that, in regard to the former, the effect resulting from the direct action of force is mainly considered, whereas in the latter case the mutual effects resulting from both action and reaction are taken into account.

I shall state the matter in Mr. Spencer's own words. "When a uniform aggregate is subject to a uniform force, we have seen that its constituents, being differently conditioned, are differently modified. But while we have contemplated the various parts of the aggregate as thus undergoing unlike changes, we have not yet contemplated the unlike changes simultaneously produced on the various parts of the incident force. These must be as numerous and important as the others. Action and reaction being equal and opposite, it follows that, in differentiating the parts on which it falls in unlike ways, the incident force must itself be correspondingly differentiated. Instead of being as before, a uniform force, it must thereafter be a multiform force—a group of dissimilar forces" (§ 156). "A uniform force, falling on a uniform aggregate, must

undergo dispersion; that falling on an aggregate made up of unlike parts, it must undergo dispersion from each part, as well as qualitative differentiations; that in proportion as the parts are unlike, these qualitative differentiations must be marked; that in proportion to the number of the parts, they must be numerous; that the secondary forces so produced must undergo further transformations while working equivalent transformations in the parts that change them; and similarly with the forces they generate. Thus the conclusions that a part-cause of Evolution is the multiplication of effects, and that this increases in geometrical progression as the heterogeneity becomes greater" (§ 161).

Everything stated here depends upon the determinations of the forces, whether incident or reactive. When the aggregate is subjected to a force which happens to be *uniform*, its constituents being *differently conditioned*—(differently *determined* as to their condition)—they are of course "*differently* modified." Again, when the uniform force falls on an aggregate made up of parts *not uniform* but *unlike*, we have a different condition of things—a condition *differently determined* and consequently a different result, the aggregate "must undergo dispersion from *each* part, as well as qualitative differentiation," and the more so as the parts happen to be *unlike*. And again, as these unlike parts happen to be the *more numerous*, the qualitative differences will also be the more numerous.

What has the persistence of force to do with all this? Absolutely nothing. It explains nothing to

say that force is persistent, that no part of it is created or destroyed, but remains permanent. In all these multifarious effects every peculiarity and difference is explained by the preceding conditions out of which it arose. It is this, and this alone, which determined it to be what it is. Or in other words, it is this which determined the force which produced it—determined that the force should produce it as it did, and not otherwise.

It is absolutely impossible that these mechanical actions and inter-actions can account for organic evolution. They are clearly seen to have no adaptation whatever for determining molecular motion. They cannot explain how the organic form can be built up molecule by molecule according to the objective idea of the organism to be formed.

Segregation.—"The general interpretation of Evolution," says Mr. Spencer, "is far from being completed in the preceding chapters. We must contemplate its changes under yet another aspect, before we can form a definite conception of the process constituted by them. Though the laws already set forth furnish a key to the re-arrangement of parts which Evolution exhibits, in so far as it is an advance from the uniform to the multiform; they furnish no key to this re-arrangement in so far as it is an advance from the indefinite to the definite. On studying the actions and reactions everywhere going on, we have found it to follow inevitably from a certain primordial truth, that the homogeneous must lapse into the heterogeneous, and that the heterogeneous must become more heterogeneous, but we have

not discovered why the differently-affected parts of any simple whole become clearly marked off from each other, at the same time that they become unlike. Thus far no reason has been assigned why there should not ordinarily arise a vague chaotic heterogeneity, in place of that orderly heterogeneity displayed in evolution. It still remains to find out the cause of that local integration which accompanies local differentiation —that gradually-completed segregation of like units into a group, distinctly separated from neighbouring groups which are severally made up of other kinds of units. The rationale will be conveniently introduced by a few instances in which we may watch this segregative process taking place" (§ 163).

A number of instances are then adduced by Mr. Spencer, of which the following may be taken as examples. Out of the mixed mass of foliage in the branches of a tree, the strong current of air carries away the decaying and brightly-tinted leaves, but fails to detach those which are still green. By the action of the uniform force which the wind exerts on both kinds, the dying leaves are picked out from among their still living companions and gathered in places by themselves. Again, the separation of particles of different sizes, as dust and sand from pebbles, may be similarly effected, as we see on every road in March. In every river we see how the mixed materials carried down, are separately deposited, how in rapids the bottom gives rest to nothing but boulders and pebbles; how, where the current is not so strong, sand is let fall; and how, in still places, there is a sediment of

mud. This selective action of moving water is commonly applied in the arts to obtain masses of particles of different degrees of fineness, as, for example, in the manufacture of emery paper. Take still another case of this sorting process. Take a handful of pounded substance, containing fragments of all sizes, and let it fall to the ground while a gentle breeze is blowing. The large fragments will be collected together on the ground almost immediately under the hand; somewhat smaller fragments will be carried a little to the leeward; still smaller ones a little further; and those minute particles which we call dust will be drifted a long way before they reach the earth. On sea-shores, the waves are ever sorting out and separating the mixed materials against which they break.

Segregation is virtually a species of natural selection, and this is the reason why it explains so much. It belongs entirely to the Right factor, and forms no essential part of Mr. Spencer's system of force. Every case which he adduces or can adduce, when properly analysed, will be found to result not from force, or the persistence of force, but from the *determination* of force—the *way* in which the force acts, or the *conditions* under which it is exerted. Neither force nor the persistence of force explains anything. In fact it is because it is no part of Mr. Spencer's system (the Left factor) that it furnishes a key as he says, "to the re-arrangements of the parts in so far as it is an advance from the indefinite to the definite." This result, in his view, is obtained by what he calls segregation.

When unlike units of an aggregate, he states, are uniformly subjected to the same incident forces, they become sorted into their kinds; and, on the other hand, when like units of an aggregate are subjected to different incident forces, they are parted and separately grouped. When unlike incident forces have made the parts of an aggregate unlike in the nature of their component units, there arises a tendency to separation of the dissimilar units from one another, and to a clustering of those units which are similar. In this manner local integration is supposed to accompany local differentiation.

These principles explain how a mass of earth, for example, acted on by the incident force of running water, becomes separated into gravel, clay, and mud; or how, out of the mixed mass of foliage, a strong wind will carry away the brightly-tinted leaves, and leave the green attached to the branches; or how, when water is allowed to percolate through a mixed aggregate of soluble and insoluble substances, the soluble is carried away, while the insoluble is left behind. They will also show how, in a mass of nebulous matter scattered through space, motion towards a general centre of gravity will take place, accompanied with local aggregations of the mass dividing into groups, each concentrating round its own centre of gravity. Or, in the regions of biology, they will show how it is that when a great variety of different organisms are subjected to the influence of a combination of incident forces, a certain number bearing particular characteristics will be picked out

and preserved, while the rest will either wholly or partially perish or disappear.

Those principles of segregation will explain all these and a multitude of other facts of a similar mechanical character, but from the nature of things they can never reach the real problem of organic evolution; viz., what determines molecular motion. They may account for the simple grouping together of molecules that are alike, or the separation of those that are unlike, but they will never account for the arrangement of the molecules into organic forms. In the formation of an organism the mere clustering of the molecules according to their likeness or unlikeness could never affect the end. The molecules must be arranged, not according to their resemblance to each other, but according to the objective idea or form of the organism to be produced. But there is absolutely nothing in the principle of segregation that could lead to this result.

The question is now asked: "Can the general truth thus variously illustrated be deduced from the persistence of force, in common with foregoing ones?" Segregation reduced to its most abstract form Mr. Spencer states to be this: viz., "That in the actions and reactions of force and matter an unlikeness in either of the factors necessitates an unlikeness in the effects; and that in the absence of unlikeness in either of the factors the effects must be alike." When thus generalised, he says the immediate dependence of this proposition on the persistence of force becomes obvious.

Had Mr. Spencer carried his analysis a little further, he would have found his principle of segregation deducible, not from the persistence of force, but from a far more general and abstract principle, namely, "The same cause acting under the same conditions will always produce the same effect."

It is true that the same force acting under the same conditions will always produce the same effect, simply because it is true that the same cause acting under the same conditions will always produce the same effect. In almost every case the conclusions which Mr. Spencer draws from the persistence of force appear to be deductions from this general principle; and while it may be true that they are in many cases correct, yet they are so solely in virtue of this principle. The analysis, however, does not stop here, for this principle, as was shown in the chapter on Causation, is again in turn deducible from the more general one that "every effect must have a cause," or that "every event or everything which comes to pass must have a cause." This is evident, because if the cause acting under absolutely the same conditions would not always produce the same effect, but should produce one kind of effect at one time and a different kind of effect at another time, then here would be something coming to pass without any cause, viz., the change from the one kind of effect to the other. If such a change were to take place, it would be absolutely unaccountable. The principle that everything which *comes to pass* must have a cause forbids such a conclusion.

CHAPTER XII

DETERMINISM IN RELATION TO DARWINISM

I SHALL now turn to the consideration of the Right factor; and here the greatest representative is undoubtedly Mr. Darwin. Darwinism is out and out a theory of Determination, and in this lies the great secret of its power. Darwin is now regarded by many as the Newton of Natural History. His great law of natural selection and the principle of the preservation of the useful varieties in the struggle for existence have, they think, done for Natural History what Newton's great law of gravitation did for the physical sciences; viz., brought order out of chaos and established a sure foundation for future inquiry. Determinism, and Determinism alone, accounts for the singular success of this theory. This is evident when we consider that the results of natural selection are effected, not by the exertion or persistence of force, but by the *way* in which the forces are exerted. It is not, for example, because of the mere strength possessed by A that he survives while B perishes, but because his strength happens to be *greater* than that of B. The thing is effected not by power but by the *determination* of power. Blind

force, unless properly directed, is of little avail in the struggle for existence. It is not the absolute amount of intelligence or skill possessed by an individual that generally secures to him his position, but the *superiority* of his intelligence and skill to that of his competitors.

That the marvellous achievements of natural selection in the struggle for existence have been the result of determination, and not of force or power, will be obvious from a mere statement of the fundamental principles of the theory, which statement I have to a considerable extent compiled from Mr. A. R. Wallace's "Darwinism."

Statement of the Theory.—The theory of Natural Selection rests on two main classes of facts which from their generality may be regarded as fundamental principles. The first is the enormous increase in geometrical progression possessed by all organisms; the second the occurrence of individual variations combined with the hereditary transmission of such variations. From the first principle, it follows necessarily that there must be a constant struggle for existence, seeing that the number of the offspring so greatly exceeds that of the parents. They destroy each other, they starve each other. They are killed by cold and heat, rain and snow, floods and storm. "There is thus," remarks Mr. Wallace, "a perpetual struggle among them which shall live and which shall die; and this struggle is tremendously severe, because so few can possibly remain alive."[1]

The importance of the second principle is obvious.

[1] *Darwinism*, p. 11.

If there were no variations and all the individuals of each species were alike, there would be no grounds why one individual should be preserved rather than another. Variation gives scope for the action of Natural Selection. All the individuals are, however, not alike. They vary in many ways, some are stronger, some are swifter, and possess a better constitution, and others are more cautious and cunning. Any beneficial variation will give the possessor of it a better chance of passing through the struggle, and as a whole the fittest will be sure to survive. An obscure colour, remarks Mr. Wallace, may render concealment more easy for some; keener sight may enable others to discover prey or escape from an enemy better than their fellows, and thus to be preserved.

It is necessary in addition that these beneficial variations should be hereditary and be transmitted from one generation to another, or the effect of natural selection would not be cumulative. Natural Selection will secure the existence of that variation best suited for its environments; and from this new variations will take place, when again the best suited will be selected. Thus generation after generation the species will improve and gradually rise to a higher platform. Variations go on in this manner, increasing in amount to an enormous extent. The bearing of all this is most important. For if in each generation the fittest survive, then whatever may be the special peculiarity that produces fitness in the particular case, this peculiarity will go on increasing so long as it is useful.

In all this we have so many processes of determination. Natural Selection in every case is such a process. It *determines* who shall live and who shall die. It *selects* who is fit and who is unfit to undergo the struggle for life. In fact it is not conceivable that Natural Selection can be anything else than a case of determination. It is needless to adduce examples to illustrate this fact, for there never was, is, or can be a case of Natural Selection which is not a case of *determination*. Its very name shows it to be essentially determination and determination alone. Natural Selection is simply a part of that universal Determinism which constitutes not only Evolution but the whole process of nature, organic, inorganic, mental and moral.

The sphere of Natural Selection is, however, limited. There are certain fundamental facts or principles belonging to Darwinism which Natural Selection certainly cannot explain, because they are conditions to the very existence of Natural Selection itself. Without them Natural Selection would have no field to operate on. The principles to which I refer are, (1) the multiplication of the offspring in geometrical progression, (2) variability of species, and (3) heredity, or the transmission of variations. It would be reasoning in a circle to attempt to account for these by means of Natural Selection.

The position that Natural Selection assumes in the economy of nature seems to be this. Looking around we observe everywhere, in both the animal and the vegetable world, organisms being produced in

such abundance that it is impossible they can all survive. There is neither room for the plants nor food for the animals that are being brought forth. Some must necessarily perish if the operations of nature are to go on. Hence we have everywhere a struggle for existence. The question arises, Which are to perish and which are to live? Reason replies, Since all cannot live, let the inferior perish, and those best adapted for the conditions of life survive. But how is this to be accomplished? How are the good to be separated from the bad? Darwin has solved the problem by showing that this can be effected by Natural Selection. By Natural Selection the best will be picked out and preserved, while the rest will perish in the struggle. A means more simple and better adapted to effect the end could not be conceived. The sphere of Natural Selection does not, however, extend beyond this. This is all that Natural Selection will do. This is all that it can do. Nor can it even do this, for there is in reality no actual selection, no actual picking out of the particular forms to be preserved. What there is, is merely this. A mass of organisms are struggling with each other for existence. The greater part of these perish in the struggle, leaving those best fitted for the battle to possess the field. Natural Selection, when thus viewed, is simply the survival of the fittest.

Definite Variability.—The foundation of the Darwinian theory, as Mr. Wallace remarks, is the variability of the species. And a question of primary importance is this: Is variability indefinite or definite? If

variation be indefinite it offers for Natural Selection any line of development which chance variation may turn up; and, of course, in this case, any result possible by Natural Selection may be obtained. But if variation is definite the sphere becomes very limited. For if species tends to produce variations of a limited number and kind, then all that Natural Selection can do will be, as Professor Huxley remarks, to favour the development of some of these, and oppose the development of others along their predetermined line of modification. The limited number of the variations and their predetermined character thus materially narrow the field of Natural Selection.

The opinion appears now to be gaining ground that variability "is definite, and is determined in certain directions rather than in others by conditions inherent in that which varies." "A whale," says Professor Huxley, "does not tend to vary in the direction of producing feathers, nor a bird in the direction of producing whalebone."

Professor Mivart's Theories.—It has been maintained by Professor Mivart[1] that the evolution of species by natural generation is the result of two factors, (1) heredity, or the innate tendency which each organism possesses to reproduce its like, and (2) the action of its environment upon the nascent organism: an action exercised directly upon it, or indirectly upon it through the direct action upon its parents. Consequently no organism, or race of organisms, he concludes, *can* vary in an absolutely indefinite manner:

[1] *On Truth*, p. 512.

and if so, then unlimited variability must be a thing absolutely impossible—variability being the result of the reaction of the special nature of each organism upon the stimuli of its environment.

Mr. Darwin's Theory.—Darwin agrees with Mivart in attributing variability to the two factors, the nature of the organisms, and the nature of the conditions. The former he regards as by far the more important of the two; but he differs from Mivart in concluding that variability is both definite and indefinite. Indefinite variability, he believes, is much more common than definite. Mr. Darwin seems to regard the organisation as absolutely plastic and in a state of unstable equilibrium ready to vary in any possible direction.

Indefinite variability evidently suits Darwinism better than definite; but one would suppose that, if variability be the result of the reaction of the special nature of each organism upon the stimuli of its environment, it should be definite in its character. In other words, it should be just what the combined action of these two factors necessarily makes it. Variations certainly do not take place in a haphazard manner. They must result from causes which act according to fixed and definite laws.

Mr. A. R. Wallace's Theory. — A theory of the cause of variability, based on Professor Weismann's theory of Heredity, has been advocated by Mr. A. R. Wallace[1] which certainly seems to favour definite variation.

The problem undertaken by Weismann was this,

[1] *Darwinism*, p 48

"How is it that in the case of all higher animals and plants a single cell is able to separate itself from amongst the millions of most various kinds of which an organism is composed, and by division and complicated differentiation to reconstruct a new individual with marvellous likeness, unchanged in many cases even throughout whole geological periods? Darwin attempted to solve the problem by his theory of 'Pangenesis,' which supposed that every individual cell in the body gave off gemmules or germs capable of reproducing themselves, and that portions of these germs of each of the almost infinite number of cells permeate the whole body and become collected in the generative cells, and are thus able to reproduce the whole organism."

The theory of Weismann, on the other hand, is that the new germ-cell from which the offspring is produced, arises, not out of the body of the parent, but direct from the parent's germ-cell itself. At every new birth a portion of this specific germ-plasm, which the parent egg-cell contains, is not used up in producing the offspring but is reserved to produce the germ-cells of the following generation.[1]

"But if this were all," says Mr. Wallace, "the offspring would reproduce the parent exactly, in every detail of form and structure; and here we see the importance of sex, for each new germ grows out of the united germ-plasm of two parents, whence arises a mingling of their characters in the offspring. This

[1] It follows from this theory that acquired habits cannot be inherited.

occurs in each generation; hence every individual is a complex result reproducing in ever-varying degrees the diverse characteristics of his two parents, four grandparents, eight great-grandparents, and other more remote ancestors; and that ever-present individual variation arises which furnishes the material for natural selection to act upon. Diversity of sex becomes, therefore, of primary importance as *the cause of variation*. Where a sexual generation prevails, the characteristics of the individual alone are reproduced, and there are thus no means of effecting the change of form or structure required by changed conditions of existence. Under such changed conditions a complex organism, if only sexually propagated, would become extinct. But when a complex organism is sexually propagated, there is an ever-present cause of change which, though slight in any one generation, is cumulative, and under the influence of selection is sufficient to keep up the harmony between the organism and its slowly-changing environment."

There are many indications, says Mr. Wallace, that this is the true explanation of variation. But if true, it certainly, for the following reasons, points to definite rather than indefinite variation.

In the course of successive sexual generation the difference between the individuals of a species must, of course, continually increase in new combinations of individual peculiarities. Imagine, says Professor Weismann,[1] a number of individuals of a species distinguished, each from the others; in the next

[1] *Nature*, October 28, 1886, p. 631.

generation no single individual would be like the others. Further, not one of the progeny could be identical with either of their parents, since each has combined in it the hereditable tendencies of both. In the third generation the hereditary tendencies of two individuals of the second generation would be combined, and so on. Here accordingly, the peculiarities of each individual of the species is pre-determined by the hereditable peculiarities of its ancestors. The individuals of successive generations differ accordingly from each other in proportion to the difference of their ancestry. All is thus definite and fixed.

Notwithstanding his theory, Mr. Wallace is, of course, decidedly opposed to definite variation. And the preponderance of opinion among Darwinians is doubtless at present in favour of indefinite variation.

CHAPTER XIII

DETERMINISM IN RELATION TO DARWINISM

(continued)

Innate tendency to progressive development.—A point of even still greater importance than that of variability is whether there is or is not in organisms an innate tendency to development, as has been maintained by Nägeli, Kölliker, Mivart, and others; a development which would take place to a certain extent though there were no natural selection. In short, that there are in reality positive causes of development which have their explanation, not in the principle of utility and adaptation, but in the internal disposition of the organism itself.[1]

Lange, though a zealous advocate of Darwinism, believes that this doctrine of a natural tendency to progressive development has a real existence, and that it acts as a co-operating cause of evolution; and he advances a number of facts and considerations in support of this conclusion. He adduces, for example,

[1] This theory of an innate tendency to progressive development has been strongly opposed by Professor Weismann, who maintains that all the facts to which it appeals can be satisfactorily explained on the principle of natural selection.

the case of the transformation of the branchial axolotl into a gill-less newt form, and also the case of a kind of frog which passes through the tadpole state in the egg and jumps from the egg as a ready-made frog. In all such cases, he says, "the co-operation of inner formative causes with the conditions of existence is obvious, and it cannot be denied that natural selection plays the decisive part in some of them, though in the transformation of the axolotl which suddenly changes from a water creature into an air creature, there can be no question of natural selection or the struggle for existence. From the standpoint of one-sided Darwinism the thing can only be explained by bringing the whole transformation under the notion of variation, and perhaps making the removal into another climate the occasion of the variation. In wild nature the new form would now have to undergo the struggle for existence, and to fix itself by breeding before the process of forming a species would be completed. But it is very easily seen that such an extension of the notion of variation really includes everything that the champions of the law of development can require, for nobody will believe that this change is an accidental one, compared with which any other conceivable change might just as well have occurred, but we see that here a movement was made in, as it were, a predescribed course." [1]

Lange then tries to picture out the natural causes which may be supposed to underlie this law of progressive development. These, he thinks, may be

[1] *History of Materialism*, iii. 55.

found in the carbon theory of the "quantivalence" of atoms. "If we look," he says, "somewhat closely into the chemistry of carbon compounds, we find that there already exists a complete theory for the formation of organic acids, which we may very well compare with a law of development. The 'plan' of this whole development lies pre-described in the doctrine of the 'quantivalence' of atoms; and as by a fixed principle of substitution any given organic acid can, as it were, be developed onward into another, we have a possibility running, as it seems, to infinity of ever more complicated and ever more manifold formations before us, which, despite their enormous multitude, follow only a narrow and pre-described course. What can or cannot arise is determined in advance by certain hypothetical properties of the molecules."[1]

He then refers to the connection between matter and form. In crystals, for example, there is a connection between the form of the crystal and the mode of composition of the crystallised matter. A similar connection may exist between matter and form in organisms. But all this implies, of course, peculiarities in the molecules. In this connection between form and matter we have, he says, before us the law of development of organisms in the most palpable shape as the law of substitution of carbon compounds.

The law of development gives the *possible* forms; natural selection from their enormous multitude chooses the *actual* forms; but it can summon forth nothing that is not contained in the plan of organisms,

[1] *History of Materialism*, iii. 56.

and the mere principle of utility becomes impotent if a modification of the animal is required which is against the law of developments.

This carbon theory of Lange, for reasons which will afterwards come under consideration, seems unsatisfactory as an explanation of the process of nature.

Mr. Spencer's Factors.—That evolution can take place without natural selection seems to follow from the well-known physiological law that the use of an organ tends to develop and strengthen it, while its disuse tends to weaken and destroy it. The effects of use and disuse as factors in modifying species (a view held by Mr. Darwin himself) have been forcibly advocated by Mr. Spencer.[1] He has shown, for example, that the decreased size of the jaws in civilised races of mankind, and also in pet dogs fed on soft food; the abortion of the eyes in cave animals living in the dark; the decreased size in the wing-bones of the domestic duck, referred to by Darwin; the drooping ears of various domestic animals and many other instances have resulted from the comparative disuse of those organs, while, for example, the musical faculty which characterises modern Europeans as compared with their ancestors, was on the other hand due to cultivation and use. Mr. Spencer also considers in a similar manner the direct action of the environment.

All these conclusions have been, however, controverted by Mr. Wallace,[2] who contends that they may

[1] The *Nineteenth Century* for April, 1886.
[2] *Darwinism*, chap. xiv.

be accounted for by means of natural selection. Natural selection has, however, certainly this advantage that there is hardly a case to which it may not be applied, whether correctly or incorrectly, in some form or other. If, for instance, it be asserted that an organ has been much used, then it is maintained that the organ must be useful, and in this case natural selection will tend to preserve it; and, on the other hand, if it be asserted that the organ has been disused, then it is maintained that the organ must be useless and consequently a positive disadvantage to the animal; therefore natural selection will tend to destroy it.

The American School.—These factors of Mr. Spencer have been further extended and developed by the American School of Evolutionists. This school endeavours to explain all the chief modifications of form of the animal kingdom by fundamental laws of growth and the inherited effects of *use* and *effort*. In fact, it regards Lamarck's theory as of about as much importance as that of Darwin. "Wallace and Darwin," says Dr. E. D. Cope, "have propounded as the cause of modification in descent their law of natural selection. This law has been epitomised by Spencer as the 'survival of the fittest.' This neat expression no doubt covers the cause, but it leaves the origin of the fittest entirely untouched. Darwin assumes a "tendency to variation" in nature, and it is plainly necessary to do this, in order that materials for the exercise of a selection should exist. Darwin and Wallace's law is then only restrictive, directive, conservative, or destructive of *something already created*."

One important factor in this theory is a special developmental growth-force which acts by means of retardation and acceleration. This force acts quite independently of fitness, for instead of being controlled by fitness, it is the controller of fitness. Characters useful are considered to be produced by the location of this growth-force by use. Another thing which determines the direction of growth-force, and which precedes use, is effort. This effort is considered to be heritable.

As examples of the effects of use in producing structural change, the hooked and toothed beaks of falcons and butcher-birds are adduced. It is argued that the fact that these birds belong to widely different groups proves that similarity of use has produced a similar structural result. As further examples, the theory endeavours to explain, for instance, the progressive change of a four- or five-toed ancestor into the one-toed horse, and also the division of the whole group of ungulate animals into the odd-toed and even-toed divisions.

Professor Geddes's Theory.—A theory of variation and selection of a somewhat new and fundamental character has been advanced by Professor Patrick Geddes. This theory purposes to answer such questions as, How an axis comes to be arrested to form a flower? How the various forms of inflorescence were evolved? How did perigynous or epigynous flowers arise from hypogynous flowers? and other equally fundamental questions. Natural selection of chance variations can never, he says, explain such general facts as these, for

they must depend on some constant law of variation; and this law Professor Geddes considers to be simply that antithesis between reproductive functions and individual ones, or in other words between vegetative and reproductive growth, which has been familiar since the dawn of physiology, and which, when reduced to its physical terms, is deducible from the principle of the conservation of energy.

Briefly stated, he says, this view of Evolution "is that of definite variation, with progress essentially through the subordination of individual struggle and development to species-maintaining ends."

"Let us commence" (to state the theory in Professor Geddes's own words[1]) "with the origin of the flower, which all botanists agree in regarding as a shortened branch. The apparent explanation of Natural Selection (from two other alternatives, one lengthened, the other shortened), although morphologically reasonable, is at once excluded by the physiological one of inevitable shortening, since the expense of the reproductive functions necessarily checks the vegetative ones, and since we cannot speak of selection where the imaginable alternatives are physically impossible. Similarly, the shortening of the inflorescence from raceme to spike or flower-head, or its hollowing into a fig, with the corresponding reduction in the size of the flowers, receives the same explanation. . . . The internal structure of the flower is similarly modified, as may be shown in detail in the passage from

[1] Article, "Variation and Selection," in the *Encyclopædia Britannica.*

hypogyny through perigyny to epigyny (these being simply stages of the progressive arrest of the growth of the axis), in the reduction of the floral envelopes and stamens and the number of carpels and ovules, and even in the transition from perispermic to endospermic and finally exalbuminous seeds. . . . The same simple conception unlocks innumerable problems of floral morphology, large and small alike: *e.g.*, it interprets with equal ease the inevitable development of gymnosperm into angiosperm (by continuous subordination of the reproductive carpellary leaf) and the origin of refined minor adaptations, like the splitting fruit of the geranium or the cupped stigma of the pansy, not as achievements of natural selection from among fortuitous variations, but as naturally traceable to the checked vegetation of their respective types of leaf-organ, just as in the familiar case of the pinnately-lobed outer sepals of the rosebud."

These views have been controverted by Mr. Wallace,[1] who maintains that all the facts can be accounted for by natural selection.

NOTE.

It will be seen from our review of Darwinism and all the various modifications to which it has been subjected, that neither *force* nor the *persistence* of *force* is a factor of that system. Except, perhaps, in the struggle for existence, force scarcely enters as a conception. Every result of natural selection is due to Determinism and Determinism alone.

[1] *Darwinism*, ch. xiv.

CHAPTER XIV

NATURAL SELECTION CANNOT EXPLAIN PRODUCTION

THIS figurative expression, Natural Selection, is a somewhat unfortunate one, for it is apt to mislead. It has a tendency to convey the idea, and does so to many minds, that nature makes a selection. Nature does no such thing. Natural Selection is simply the survival of the fittest. There is nothing in the nature of selection but this. "The survival of the fittest" is consequently a much better expression, but it still leaves in the background a something, the want of which is also apt to mislead. Natural Selection is better expressed by saying that it is *the survival of the fittest resulting from the destruction of the unfit.* The element left out is as important a part of the process as the survival of the fittest, for it is by means of the destruction of the unfit that the fittest are preserved. It follows that if Natural Selection is simply the survival of the fit from the destruction of the unfit, it is obvious that it can produce nothing. The simple destruction of that which exists would not produce that which does not exist. The conception is absurd. Natural Selection is not an efficient cause; it has no

formative power, no positive efficiency. If a thing already exists, it will tend to preserve and perfect it, but it cannot possibly produce it. That things can be produced by natural selection is a view held by Darwinians in general. Darwin himself not only held that Natural Selection might produce an organ, but he endeavoured to show how one so wonderful as the eye, with all its marvellous adaptations, could be formed by this means.

There is certainly in all this some fundamental misapprehension. Natural Selection may be a *condition* in the formation of an organ, but, from its very nature, it cannot possibly be a producing *cause*. There must be something of the nature of an organ to begin with, however rude, simple and elementary it may be, or else Natural Selection would have nothing on which to act. Suppose a multitude of these rude elementary things, out of which the future organs will ultimately be developed, Natural Selection will preserve the most suitable forms and destroy the unsuitable. By an innate power, regarding the nature of which Natural Selection can afford no light, these preserved forms produce other forms resembling themselves; with this difference, however, that the new generation will be a slight improvement on the past. Natural Selection will again pick out as before the most favourable, which favoured ones will in turn propagate themselves, producing forms of a still higher type, and so on in like manner, generation after generation, till, what was to begin with simply a rude elementary form, assumes now something of the

nature of a suitable organ. This, I presume, is a fair statement of what actually takes place in those cases where Natural Selection is supposed to produce an organ.

Let it be observed that here everything is produced by the inherent powers and forces possessed by the organisms themselves, by which they are enabled to produce other organisms like themselves. Nothing is produced by natural selection. What natural selection does is simply to select the best specimens on which these inherent tendencies may act. All that it does, or possibly can do, is to supply the proper materials, by simply destroying the bad, and thus allowing the fittest to survive.

If we analyse, for instance, the case of the formation of the eye discussed by Darwin, we shall find that this is all the share in the process which can be attributed to natural selection. "The simplest organ which can be called an eye," says Darwin, "consists of an optic nerve, surrounded by pigment-cells covered by translucent skin, but without any lens or other refractive body." Natural selection, he affirms, may convert this simple apparatus into an eye as perfect as that of the eagle. Let us consider how this is done. Suppose a multitude of creatures possessing these pigment-eyes. In the struggle for existence, natural selection will preserve those favoured with this organ in the most perfect form and destroy the others less favoured. Those preserved propagate and their offspring possess the organ somewhat improved. Natural selection again comes into play, and picks out

those which on account of the superiority of their pigment-eyes are best fit to live. These propagate, and in the next generation another slight improvement takes place. This process of propagation, selection, and improvement goes on in this manner through countless ages till eyes become as perfect as the human.

But during this whole process of the development of the eye the only thing effected by natural selection was the preservation of those individuals which, in consequence of the superiority of their eyes, were best fitted to live: and this selection, as we have already seen, resulted from the destruction of those less fitted. The superior eyes were evidently produced by powers and forces inherent in the individuals themselves. The same energies and powers which produced the offspring produced of course the eyes also.

The personifying of natural selection tends to mislead. Natural selection is not an agent; a some*thing* which acts. It is, in the present case, nothing more than the simple fact that in the struggle for existence the individuals possessing the best eyes survived while the rest perished. In consequence of this fact those fitted to produce improved eyes were left to propagate, and thus the energies which led to the formation of the eye were, of course, directed into the best channel. Natural selection was the occasion, or more properly a *condition* in the evolution of the eye; not the *efficient* cause. Were much that has been written on the efficiency of natural selection divested of its figurative dress it would assume a very different appearance.

No doubt, much of the superiority of those left to propagate was to a large extent due to favourable variations. But these variations were, and could not be the result of natural selection. They must have arisen out of some inherent peculiarities in the individuals who transmitted the variations; or they may have been due in some cases to effects resulting from the influence of the environments on the individuals.

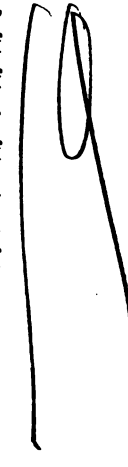
It may, however, be stated that though natural selection was merely a condition in the evolution of the eye, still it was a necessary one; for, were it not for it directing the process in the proper channel, bad eyes might be as frequently produced as good, and in this case no development would take place.

CHAPTER XV

DETERMINISM IN RELATION TO THEORIES OF LIFE

To a large extent the discussions and diversity of opinion which at present prevail in reference to the mystery of life, and the distinction between the organic and the inorganic world, take their rise in a confusion of ideas regarding the difference between the cause of motion and the cause of the determination of motion. The various theories may be divided into two classes: those in which it is maintained that all the phenomena of life, all the changes which take place in organic nature, are the result of purely chemical and physical agencies; and those in which it is asserted that there must be something more than the ordinary chemical and physical forces at work—that, in fact, life and organic nature imply the action of an agency altogether different from those which belong to the domain of chemistry and physics, an agency to which the name of "Vital Force" has been applied. Both classes appear to be to a certain extent right; and both to a certain extent wrong. Let us begin with the consideration of *the Vital Force theory*.

In what respect, then, is vital force supposed to differ from other forces? Does the difference exist in the force itself, or in the mode of its operation? Is vital force the same as the chemical and physical forces, but only differently determined? Suppose that all life on the globe, both animal and vegetable, were to be destroyed and vital force to disappear completely. Would the total amount of energy on the globe be diminished? Would the vital force which disappeared reappear as chemical or physical force? Or would there be a destruction of force? If the former be supposed, then there is no difference between vital and the other forces of nature further than in the mode of operation. Vital force would, in this case, simply be the ordinary forces of nature transformed, or, in other words, the ordinary forces differently determined. If, however, we suppose that vital force in itself is different from other forces irrespective of its mode of operation, and that when it ceases to be vital force it does not become ordinary chemical or physical force, but disappears altogether, then the destruction of vital force would involve a violation of the principle of the conservation of energy. If we do not admit a transformation of vital energy, we must assume that when a plant or an animal decays and dies, so many foot-pounds of energy existing in the molecules become extinct; and also, that when a plant or an animal increases from the embryo state to maturity, so many foot-pounds of energy come into existence.



Such a view of vital force as this would be dia-

metrically opposed to the modern science of energy, and wholly untenable. Evidently the vital energies of the plant and animal are derived from the chemical affinities of the food and nutriment which they receive. Vital force is chemical force transformed. The same remark holds true of the mechanical and other physical energies of the body. The energy by which the arm is raised or by which the heart beats is derived from the food. Animal heat is derived from chemical combination.

So far as all this is concerned, the advocates of the physical theory of life are evidently correct. But are they warranted in affirming, as they do, that all the energies of plants and animals are either chemical or physical? Whether such an affirmation be correct depends entirely on the idea which may be attached to the terms chemical and physical? If what is meant be, that all the energies in organic nature have had a chemical or physical origin, and that there is no energy in nature which has not at one time existed either as chemical or as physical energy, then no one acquainted with the science of energy would for a moment question the correctness of such a conclusion. In this case, what is termed vital energy must simply be transformed chemical or transformed physical energy. It must differ from the energies in operation in the chemical and physical worlds only so far as the mode of operation is concerned. The forces are the same, only they act differently. If this be what is meant, then assuredly every force in nature is either chemical or physical. But this involves a use of the

terms chemical and physical energies, which is altogether peculiar and unusual.

We are accustomed to name forces and energies according to their mode of operation. Oxygen and hydrogen unite under the force of their affinities; and we designate the energy of the combining substances "chemical energy." After combination the energy assumes another form, and we call it "heat." The heat is applied to the thermo-electric pile and becomes transformed: and we call the energy under the new form by the name "electricity," or "electric current." The electricity is applied to the electro-magnetic machine, and the energy assumes another form, to which the name "magnetism" is applied. The magnetism propels a machine and performs mechanical work, and we then call the energy "mechanical energy." These various names are applied to the various modes of operation of the self-same energy. Chemical energy, for example, in the case under consideration, differs from heat only in the mode of its operation.

We have also been accustomed to group heat, light, electricity, magnetism, gravity, cohesion, &c., under one class, to which we apply the general term physical, or physical energy. We thus distinguish chemical energy from all the other forms, because we conceive it to be concerned with the combinations and motions of the atoms or elements of substances, whereas the others deal with the molecules and masses of matter.

The real question at issue is, Are these forms of energy along with chemical energy sufficient to account for the phenomena of life and organic nature?

Neither Physics, Chemistry, nor Natural Selection can account for Organic Nature.—Let us briefly consider what really has to be explained and accounted for. Take, say, the leaf of a tree. The leaf is not moulded by some external agency into its particular shape. It is built up molecule by molecule. The form and structure of the leaf are the result of the arrangement and disposition of the particles of which it is composed. The thing to be accounted for is not what moves the molecules or particles in its formation, but what guides, directs, or determines the motion of these particles. The leaf could not be formed did not each particle move in the right direction and stop at the proper time and at the proper place. Each molecule occupies its own special position in the leaf: consequently no two molecules in moving to their positions can take the same path. What, then, determines the particular path for each molecule? or rather, what determines the motion of each molecule along its particular path? The mere motion of the molecules is produced by force: but what directs or determines this force to move each particle along its special path? The mystery lies deeper still. Not only are the paths of the molecules different, but they must all be adjusted in relation to one another: for it is to the proper adjustment of the paths that the form of the leaf is due. In other words, the motion of each molecule must be determined acccrding to the objective idea of the leaf.

Further, the whole tree is built up of molecules as well as the leaf. The molecules which form the branch

must be differently determined from the molecules forming the leaves; each molecule of the branch must take a path different from all the other molecules of the branch; and the motions of all the molecules must be determined according to the objective idea of the branch. What holds true of one branch holds true of all the other branches; and what holds true of the branches holds equally true of the trunk, and of the roots, and of the whole tree. Each particle must be determined not only in relation to the objective idea of the particular leaf or the particular branch to which it belongs, but in relation to the objective idea of the tree. In the formation of the tree each molecule must move along its special path, and the paths must be so adjusted to one another that a tree shall be the result. Nor is this all. The molecules must move and adjust themselves in relation to the idea of a tree of a special kind. The molecules forming, say, an oak-tree, must move in relation to one another in a different way from those forming a beech or a pine. And yet, however diversified may be the motions of the molecules in the different species of trees, nevertheless all must move in relation to the general idea of a tree. What holds true of trees holds equally true of every form of plant-life on the globe; and what holds true of the vegetable kingdom holds equally true of the animal kingdom. Each plant, each animal, has not only its own particular form, it has the form of the species to which it belongs; and not only this, but the form of the genus to which the species belongs; and not only the form of the genus, but the form of the

family, order, class, and kingdom to which the genus belongs.

Taking, therefore, the entire molecular movements going on in the organic world, animal and vegetable, we may classify the determinations of these movements into kingdoms, classes, orders, families, genera, and species, in the same way as we classify the plants and animals which are the result of these determinations of molecular motion. This is obvious, because the order and unity which the botanist and the comparative anatomist find pervading nature, owe their existence to the order and unity which exist among the determinations of molecular movements. A plant or an animal of a particular species and a particular class exists simply because the molecules of which it is formed had their motions determined according to the objective idea of a plant or of an animal (as the case may be) of the particular species or class. This is not asserting anything hypothetical; it is simply stating what actually takes place; for to say that the molecules of which a tree, for example, is composed must have had their motions determined according to the objective idea of a tree, is just the same as saying that the molecules of which a tree is composed must have had their motions determined in relation to an object of the figure of a tree. In nature we have a unity of plan pervading the endless diversity that everywhere prevails, simply because the endless and almost infinite diversity of molecular movements takes place according to a unity of plan.

In nature we have a group of molecular movements

corresponding to the objective idea of each particular object that is being formed. In objects of the same species groups of molecular movements have a specific resemblance to one another, while in the formation of all objects of the same genus there is a generic resemblance between the groups of molecular movements. In the formation of objects of the same family we have a still higher unity comprehending a still greater number of groups of molecular movements. We go on in like manner till we reach a unity which comprehends under it all the groups of molecular movements occurring in the vegetable or in the animal kingdom. The unity which pervades the endless diversity of molecular movements must be as perfect as the unity which we find to pervade the endless diversity of organic forms. In fact, the two are inseparable, because the unity which exists among organic forms is the *effect* of the unity which exists among molecular movements. It is because these molecular movements are determined according to a unity of plan that their effects, viz., organic objects, have a unity of form. It is the particular determinations of the movements of the molecules that give a particular form to the tree.

It may, however, be noticed that a thing may be the result of the determination of molecular motion, although it may not be so directly. For example, that which determines the arrangement of the buds on a twig may be something in the tissue or in the texture of the twig itself; but if we carry our inquiry backwards, we shall find that the particular form of the texture results from the particular way in which the

molecules are determined during the formation of the texture. Again, on the other hand, that which determines that some particular bud rather than some other should be developed into a branch may, as Mr. Chauncey Wright suggests, be the simple accident which leads to that bud being better supplied with nutriment, light, air, and other favourable conditions. But such an accident can lead to the development of the bud into the branch only through the determination of molecular motion. The selection of that particular bud to be the future branch may be due to these accidental circumstances. But this mode of accidental selection does not explain the special arrangement of the branches. It does not account for the objective idea in that arrangement, unless we suppose that these accidents occur according to a plan and not according to chance. Natural selection never can explain the objective idea in nature unless we suppose the selection to be made according to a design or plan. Mr. Darwin has developed a new and most important idea; but his theory can never, from its very nature, explain the mystery of the organic world. There must be a *determining* cause in the background of all natural selection working out the objective idea.

But there is not merely a unity of plan to be accounted for, but also a unity of purpose.[1] Things in nature are not only related to one another in form, but they stand related as means to ends. And this

[1] By purpose I simply mean the End to be served. Whether this end was designed by Intelligence, or not, will be considered when we come to treat of Determination in relation to Teleology.

relationship is as all-pervading as that of form. There is not an object in nature that does not stand in the relationship of a *means* to something as an *end*. And there exists a unity in the ends as well as in the forms. All molecular motions must consequently have this double relationship of plan and purpose. How, then, is all this order and unity both of plan and purpose in molecular motions to be accounted for?

CHAPTER XVI

MOLECULAR MOTION IN RELATION TO UNITY OF PLAN

I SHALL now consider the explanation of molecular motion in regard to the *Form* of objects. The consideration of molecular motion in relation of Means to Ends will be discussed in the next chapter.

The objects of nature, as we have seen, are built up molecule by molecule, and are thus the products of molecular motion. Energy is that which moves or transports the molecules in the building-up process; but it is not the mere transport of the molecules, as has been repeatedly shown, which gives to the object produced its form. The form assumed is due, not to the motion of the molecules, but to the determination of that motion—to the way in which the motions are guided and adjusted in relation to one another. It is not the energy which conveys the bricks that accounts for the form of the house, but that which guides and directs the energy. So far as the form of the house is concerned, it is a matter of indifference whether the bricks are conveyed on the backs of labourers or transported by a steam-crane. In like manner, in accounting for organic forms, we must exhibit not the mere

energy which moves the molecules, but that which directs and guides the energy.

But it has been already proved that energy cannot be determined by energy; consequently that which determines energy is not itself an energy. Therefore the thing which we are in search of, which accounts for the order and arrangement prevailing in the molecular movements in nature, is a something not of the nature of a force or an energy.

The question now to be considered is, Can this marvellous adjustment of molecular motions be explained by anything which is found within the domains of chemistry and physics? The advocates of the physical theory must afford us some explanation of the cause of the determination of molecular motion derived from physics and chemistry, if their theory in reality rests upon a true foundation.

The chief argument in favour of this theory seems to be the one to which allusion has already been made, viz., that all the energies in nature to which the term "vital" has been applied evidently have a chemical or a physical origin. For example, the vital energies of our bodies are derived from the food we eat, the water we drink, and the air we breathe: they therefore existed first under the form of chemical affinities. The same is the case in regard to plants: all the energies in operation in the plant are in like manner derived from the nutriment received through its leaves and rootlets.

This, doubtless, is true: but it is of no service to the physical theory, as we have seen: for the funda-

mental question is not what are the energies in operation, but what is it that determines their mode of operation? It does not necessarily follow, as the advocates of the physical hypothesis would seem to suppose, that because the energies which move the molecules had a chemical or a physical origin, these energies have the same mode of operation as the chemical or the physical energies have. It does not follow that these energies are either chemical or physical merely because they have had a chemical or a physical origin. Animal heat is derived from the chemical energies of the food we eat; the mechanical power by which we raise our arm or move our legs is also derived from the same source; but we do not on this account, as has already been stated, call either animal heat or the power by which we move our limbs chemical energy. We call it physical and mechanical energy. The energy is no longer chemical after it has changed its mode of operation. Then, if there are energies in organic nature which operate in a different way from those which we call chemical and physical, we have no warrant for calling them either chemical or physical merely because they may have had a chemical or a physical origin. But if energies are to be named according to their mode of operation (which is the practice in science), then energies differing from those of chemistry and physics must have a name by which they are to be distinguished. Why not call them "vital energies"?

But the advocates of the physical hypothesis do not admit that there exists in organic nature any form

of energy different in character from that to be found in the inorganic world.

We shall now consider whether anything which that school has advanced on the subject does in any way explain how molecular motions are determined according to the objective idea in nature. Energy, chemical and physical, accounts for molecular motions in organic nature; but how is it to account for the determination of those motions? If the determinations of molecular motion are to be attributed to these energies, it must be to their modes of operation—the *way* in which the energies are exerted—and not to the mere exertion itself. Suppose that the determination of molecular motion could be accounted for from the known *modes* of the operation of physical energies. The ultimate problem would then be, What is it that determines those modes of operation? In other words, the problem would resolve itself into this, viz., What is the cause of the determination of physical energies? What is it that directs the operation of those energies?

But in ascertaining whether chemistry and physics can explain the mystery of nature, the point we have to consider is whether or not there is anything in the known *modes* of operation of physical and chemical energies which can in any way account for the determination of molecular motion. If the advocates of the physical theory can show that the modes of operation of those energies do explain the determinations of molecular movement, then their theory is established, and the ulterior question as to what is the cause of those modes of operation will be worthy of

consideration, for it will then in reality be the grand problem of nature. But if the modes of operation of physical and chemical agencies do not account for the determination of molecular motion, the physical theory must be abandoned, and the solution of the mystery of life and nature must be sought for somewhere else than in chemistry and physics.

Enormous advance has been made in molecular physics and in the science of energy of late years. But it has not thrown much additional light on the cause of the determination of molecular motion, the reason being that the discoveries relate more to the quantitative relationships of energy than to the modes of its operation. It has been found that the total quantity of energy remains constant, that whatever disappears under one form reappears under some other form, and that, whatever may be its form, its amount can be determined in absolute measure. Take for example heat, the form of energy in regard to which the greatest advance has been made. Heat has been demonstrated to be a mode of motion; and the amount of energy represented by a given mass of any substance raised by a given number of degrees in temperature can be determined in mechanical units.

We know heat to be some mode of molecular motion; but we do not as yet know with certainty what that mode is. Most physicists suppose it to consist of a sort of vibratory or oscillatory motion of the molecules, while others conceive it to consist of some sort of molecular vortices. But although the mode of motion has not been determined, nevertheless

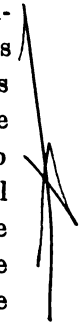
the velocity of the moving molecules can be estimated. This, however, does not enable us in any way to explain how heat can determine molecular motion in organic nature. If we knew the nature of that mode of motion which constitutes heat, it might possibly be of some service; but a knowledge of the *quantity* of motion can throw no light on the matter. Heat no doubt is an essential condition to the formation and growth of all living things, whether plants or animals; but heat is evidently not the determining cause of the motion of the molecules. We may in thought conceive heat to be a cause of the motion of the molecules; but we cannot conceive any adaptation in the mode of operation of heat that can explain the determination or direction given to the molecules. Whatever may be the nature of that molecular motion called heat, we have simply a repetition of the same mode of motion; and there is consequently nothing in it to account for the endless diversity of molecular motion which exists in organic nature. Heat, instead of tending to build up complex organic structures, tends, on the contrary, to produce the opposite result. The tendency of heat is to produce homogeneity—to reduce all bodies to one molecular condition. Its direct tendency is not to build up, but to tear asunder and break down. In short, heat tends to produce *dissolution*, not *evolution*.

If we are in ignorance as to the nature of that mode of motion which constitutes heat, we are still more so in regard to that mode of motion called electricity. Who, then, can assert that there is any

thing in the nature of electricity that will account for the determination of molecular motion in organic nature? The mere energy of electricity, like any other form of energy, may be conceived to produce molecular motion; but mere energy will not determine motion. If there be anything in electricity that can account for the determination of motion, it is not its energy, but the *mode* of operation of the energy. But as to what this mode actually is we know nothing whatever. We know the effects which this energy produces on masses of matter, but not the nature of the molecular effects produced. Of that particular thing connected with electricity which could be of any possible service to us in reference to the question at issue we at present know absolutely nothing.

But notwithstanding our ignorance in regard to the nature of that mode of motion called electricity, we are perfectly able to determine from the character of the effects produced by it that, even though our knowledge of it were perfect, it would not afford us any explanation of the cause of the determination of molecular motion in the organic world. We know that electricity, like heat, is a simple repetition of the same mode of motion. The mode of motion in one part of the telegraphic wire is the same in all other parts; and such as it is in one wire, so is it in all other wires. And what holds true of heat and electricity holds equally true of magnetism, light, and all other forms of physical energy; and it is needless to say that what holds true of physical energy holds equally true of chemical energy.

Molecular physics has made great advance of late years; but it has not made much advance in that particular direction which can be of service in explaining how molecular motion in organic nature is determined. It is thought, however, by the advocates of the physical school that although at present we are unable to explain how organic nature can be built up by the play of the ordinary chemical and physical forces, yet at some future day, when we shall have come to know far more of molecular physics than we do at present, then we may be able to explain the mystery. This is the cherished hope of modern Evolutionists, and of the advocates of the physical theory of life. But it is a mental delusion, a dream which will never be realised. A little consideration might satisfy any one that Chemistry and Physics will never explain the mystery of nature.



The terms Light, Heat, Electricity, Magnetism, &c., are different names which we apply to different modes of molecular motion; and it is true that at present little is known regarding the nature of these modes of motion: but notwithstanding this we have reason to conclude that, although we knew all that absolutely could be known regarding them, yet it *would not afford us any explanation* of the cause of the determination of molecular motion in organic nature.

The character of a cause may often to some extent be judged indirectly from the nature of the effects produced. It is from the effects produced that we know, for example, that that mode of molecular motion called Heat differs from that mode called Electricity.

The effects do not as yet enable us to determine wherein this difference consists; but it enables us to conclude with certainty that there is a difference. Effects which are electrical we refer to that unknown mode of motion called Electricity. We do not refer them to that mode called Heat, because the effects are different from those which we ascribe to Heat. Each mode of motion, each energy is distinguished by the effects which it produces. Determination of the molecules of matter according to the objective idea of a plant or an animal, is an effect which is constantly taking place in organic nature. To attribute this effect to Electricity, for example, would be far more absurd than to attribute electrical effects to gravitation or to heat; for the difference between this effect and any electrical effect is immeasurably greater than between electrical effect and any effects produced by heat or by gravitation or any other of the forces of inorganic nature. It would be far more rational to attribute all the phenomena of the inorganic world, say, to heat, than to attribute the determination of molecular motion in the organic world to chemical and physical energies.

It must now be obvious that nothing which can be determined by the comparative anatomist, no biological researches, no microscopic investigations, no considerations regarding natural selection or the survival of the fittest can solve the great problem of nature; for it lies in the background of all such investigations. The problem is molecular. From the hugest plant and animal on the globe down to the smallest organic speck visible under the microscope,

all have been built up molecule by molecule; and the problem is, to explain this molecular process. If one plant or animal differs from another, or the parent from the child, it is because in the building-up process the determinations of molecular motion were different in the two cases; and the true and fundamental ground of the difference must be sought for in the cause of the determination of molecular motion. Here in this region the doctrine of natural selection and the struggle for existence can afford no more light on the matter than the fortuitous concourse of atoms and the atomical philosophy of the ancients.

CHAPTER XVII

MOLECULAR MOTION IN RELATION TO UNITY OF END OR PURPOSE

THERE is probably not an object in organic nature which does not serve as a means to an end or purpose. Every object has a definite form or plan, but it has also a purpose or end to serve, however subordinate that end may be. Purpose or end in nature is all-prevailing as plan. The end is of more importance than the plan. The plan is almost always subordinate to the end, for it generally stands as a means to it. The plan exists for the sake of the end. We have in the end the *rationale* of the plan, the explanation or reason of its existence. The branches and blossoms exist for the sake of the fruit. And when the seed was put into the ground the fruit was the end towards which the whole was tending. The fruit is, of course, not always the end. The beauty and fragrance of the flower exist as ends, and that important ones for sentient beings.

Ontogenesis is altogether a process of means towards a definite end. The development of each organism takes place according to the objective idea of the

end to be reached. Take the case of the egg, which contains a semi-fluid mass of two homogeneous substances. The mass when submitted to certain conditions of heat, moisture, &c., gradually assumes an organic form. A heart and lungs appear, blood is produced which begins to circulate. At last a living bird breaks the shell and walks forth.

Still more striking is the case of the development of the human embryo. The first germ of the future human body appears, says St. George Mivart,[1] in the shape of a minute rounded mass of protoplasm from which by degrees all the varied tissues and all the complex parts which constitute the adult man are derived. This simple protoplasmic particle or cell divides and subdivides itself again and again till three layers of cells are gradually but rapidly formed. Soon a groove appears on the surface of the embryo, wherein is laid the foundation of the brain and spinal cord, and beneath the latter that of the backbone. Then, after certain other foldings, a heart shows itself and beats, and blood is formed and circulates. Limbs also grow forth, and jaws and sense-organs form themselves, and, little by little, the at first shapeless mass more and more approximates to the human form.

Another remarkable fact pointed out by Haeckel,[2] is that all vertebrate animals of the most different classes—fishes, amphibious animals, reptiles, birds, and mammals—in the first periods of their embryonic development cannot be distinguished the one from the other. And he has shown that in ontogenesis, or the

[1] *Truth*, p. 172. [2] *History of Creation*, i. 309.

development of the individual, we have a short and quick repetition of phylogenesis, or the development of the tribe to which the individual belongs. In other words, the individual in its development passes through all those remarkable transformations undergone by the tribe or chain of its ancestors.

The whole process of development from the germ to the perfectly-formed individual is one of differentiation and determination. Each cell is formed molecule by molecule and determined to its proper position in relation to the end which it has to serve and the place which it has to occupy in the body. The whole is a process on which natural selection fails to throw a single ray. The question at bottom is one regarding the determination of molecular motion. What determines the molecules to take their proper positions? Each molecule must be determined in relation to the objective idea of the end it has to serve, or the end could not be reached.

Whatever may be the cause which determines each molecule to take up its special position in relation to the objective idea of the end to be served, it cannot possibly be natural selection. One necessary condition to natural selection is a struggle for existence: but here we have no struggle, no preservation of the fittest by the destruction of the unfit. No molecule is destroyed because it is unsuited. And supposing it were destroyed this would have to be done in relation to the end to be served, and in addition this would not confer on the molecules which survived their proper determinations.

Natural selection can of necessity go but a short way in explaining the operations of nature. It is, as we have seen, neither more nor less than the destruction of those organisms least fitted for the condition of their existence and the allowing of those best fitted to survive. It cannot produce the best fitted or throw a single ray of light on the process by which they are produced. It secures, however, as we have seen, the continued existence of the fittest, and it also explains how it is that as a rule organisms suit the conditions in which they exist. It is this latter circumstance, I think, which has so erroneously led to the belief that Darwinism is hostile and even fatal to the Design argument.

CHAPTER XVIII

EVOLUTION: A PROCESS PERFECTLY CONTINUOUS

Amid all change constituting evolution there is a something which persists. In organic or physical nature, this abiding reality or substance is *matter*. But Matter, we have seen, when properly analysed, resolves itself into *force*, for it is through its manifestations as force that it becomes known to us. What force is in itself apart from its manifestations we are unable to say: only it is not a mere metaphysical abstraction. It is, as Mr. W. B. Taylor remarks,[1] the most real, the most fundamental of things. In mental evolution, on the other hand, this abiding reality, forming the essential content, is *mind*, a substance different from matter. But again, what mind is apart from its manifestations as thought, will, and feeling, we cannot tell any more than we can do in regard to matter.

The persistence of force is, as Mr. Spencer maintains, a fundamental principle; and organic revolution consists in the *determinations* of this persistent force. It is, however, not the persistence of force, but

[1] *Physics and Occult Qualities*, p. 45, Washington, 1882.

its determination that accounts for evolution. And the same is true in regard to mental evolution, for it is not the existence of mind but its *determinations* which accounts for the process.

The state of the Universe at any moment, as has already been noticed, was inevitably determined by its state the moment before, and this must have held necessarily true during all past time. The change from the one state to the other is perfectly continuous; cause passing insensibly into effect. There is no interval of time between the one state and the other. A tree is not the same at any given moment that it was at the moment before: for during the interval, infinitesimal as it may have been, millions of determinations would probably have taken place amongst its molecules.

The one state may be said to be the negation of the other. "The bud," as Hegel remarks, "vanishes with the appearance of the blossom—the one being the contradiction of the other. The fruit, again, proclaims the blossom a spurious form of the plant's existence, the truth of the one passes over to the other. These forms are not merely distinct, but crush each other out as being mutually incompatible." Manhood is the negation of childhood, and every step in the growth or progress of the child is a step towards the negation of childhood. But amongst all those changes there is more that remains than the mere process or law of evolution which Hegel's theory assumes. Force remains as a permanent reality, and the changes which take place are simply determinations of force.

It must then be observed that the explanation of organic nature is to be found not in this force, but wholly in its determinations. So far as evolution is concerned, Determinism, not force, is the foundation-stone.

CHAPTER XIX

DETERMINISM IN RELATION TO TELEOLOGY

As was stated before, everything in organic nature is formed according to some definite plan, and is also subservient to some definite end. Whether the plan was designed or the end purposed many dispute; but no reasonable person will dispute the actual existence of plan and end.

Those plans and ends must, however, be referred to some cause. Whatever that cause in reference to organic nature may be, we know that it must include determinism; for every organism in nature is built up molecule by molecule, and each molecule must have been determined to its particular position in the organism. The molecules do not fly hither and thither in all directions and by chance arrange themselves into some organic form or other. On the contrary, every one of them is unerringly directed to its particular position in the organism, and a being of sufficient intelligence would perceive in their motions the end according to which these motions are being determined. The special form of the organism

results from the particular determinations of the molecules; and, when we grant this, we see that Teleology must follow as a necessary consequence, since the special form of the organism stands in the relation of an end or Final Cause to the determinations of its molecules. The organism would never be produced were not all the motions of the molecules determined in relation to its form. This *form* is, as it were, the objective idea according to which all the motions take place. That something, whatever it may be, which determines molecular motion may be regarded as the Efficient Cause; and the Form according to which the motions are determined may be called the Final Cause, or the End to be attained by all these motions. What we know, therefore, is that all those determinations to which we have referred must have been made in relation to plan and purpose.

This proves that Darwinism cannot possibly afford the explanation for which we are in search; for it cannot, as we have already seen, account for the determination of the molecule according to the objective idea of an end. Darwinism will account for the evolution and development of the organism best fitted for the conditions of existence; for natural selection, in the struggle for existence, will secure the survival of the fittest by the destruction of the unfit. This is its great *end* or *purpose* in the economy of nature, and a means better adapted to secure this end could not well be conceived; but this is all that natural selection will or can do. This process will,

of course, tend to improve the species; for, as like tends to produce like, if we continue to destroy the unfit and preserve the fit, every new generation may be expected to be a slight improvement on the past.

Those who imagine that Natural Selection has given the death-blow to the Design argument certainly fall into error. They forget several important considerations. They forget, for example, when they say that an effect necessarily proceeds from its cause, that this is no proof that the effect was not designed, or that the cause was not chosen to produce it. If there are two or more ways of arriving at an end, then, other things being equal, an intelligent being would choose the way which would most infallibly secure that end; he would select the means necessarily and indissolubly connected with that end. Before natural selection can come into operation, organisms must be produced. If natural selection could form these organisms as well as select them, then it might be argued that this principle was hostile to Teleology. But it has been proved that natural selection can do no such thing, for natural selection cannot be the cause of the determinations of molecular motion. Now since the organism must be produced by other causes, there is no evidence to conclude that natural selection is not a means designed for the end which it accomplishes. Could it be proved that nature is self-evolved from matter, motion, and force, then natural selection could not be an end determined by an intelligent cause. But it never has been proved that nature has been thus evolved, and it never can be, so long as it remains

impossible to account for the determination of molecular motion by means of matter, motion, and force.

It is, of course, true that in a multitude of cases natural selection completely accounts for the thing fitting the conditions of its existence, without having to assume that it is designed to fit those conditions: the thing fits the conditions, because those which were unfit have been destroyed in the struggle. Purpose or end, is, however, best seen in cases where no struggle can possibly take place, as for instance in the determination of molecular motion. There the molecules in an organism, as has been stated, are all determined to their proper position *without destruction.* It is not the destruction of the unfit which places the fit in their proper positions. The grand, the difficult, and as yet unanswered question is this: What guides the molecule to its proper position in relation to the end which it has to serve? We know that it cannot possibly be natural selection, and we know also that it cannot be *force* or the *persistence* of force. Force will account for the motions of the molecules, but not for their determinations. Efficient causes, in the ordinary sense of the term, will not account for the determination of molecular motion. They account for the *motion* of the molecules, but not for their determination according to an end or purpose. Cause must be here viewed in the broad sense stated in the chapter on Causation, *i.e.*, as not necessarily implying effort or force.

Some Evolutionists do not rest their arguments against Teleology on natural selection entirely. They

urge a variety of other objections. They urge to begin with, that *the enormous waste and destruction which are continually going on in every department of life, are inconsistent with the idea that nature is the product of an intelligent cause acting according to a purpose.* From the pollen of the plant, it is maintained, to the fertilised seed, from the seed to the germinating plant, and from this to the full-grown plant bearing seed in its turn, we see everywhere manifold production followed by immediate destruction: the perishing of vital germs, the abortion of processes begun, is the rule; the natural development is a special case among thousands, and is thus the exception. This, it is assumed, would not be the case if the operations of nature were under the control of an intelligent cause operating according to a wise purpose. Now, before this objection can be urged, it must first be shown that this fulness and superabundance of life are, all things considered, a decided loss, imperfection, and defect, and that a real advantage, gain, and improvement would take place were nature less prolific. Unless this can be proved to be the case, this fertility of nature can be no evidence of a want of intelligence or design, but the reverse. What conceivable advantage could be gained by a less abundance of life? This extreme fertility does not in any way impoverish nature. On the contrary, the advantages obtained from this superabundance of life are most obvious. It is in consequence of this fertility and abundance of life that the surface of the ground is kept constantly covered with verdure and vegetation and the world stocked with animals. In the case of a

glacial peoch, for example, when a country becomes almost deprived of life, it would remain for countless ages in this barren condition were it not for the fact that nature is so prolific. The same would hold true, though to a lesser extent, in the case of a tract of country being partially deprived of life by some calamity such as inundation or fire. If a field produced no more seed than would simply be sufficient for next year's crop, the earth would soon become a barren wilderness. There are other obvious ends served by this apparent prodigality of nature, but into the details of these I need not here enter: it is sufficient to say that through this prodigality nature sustains no real loss.

The very imperfectly-formed character of the great mass of organisms which exist, has also been urged as proof that nature could not be the product of a designing cause. It is overlooked in this objection that the undeveloped condition of the greater mass of organisms is a necessary result of the abundance of life. For, if an intelligent cause designed that there should be a superabundance of life, it follows as a necessary consequence that the greater mass of organisms which come into existence could not have an opportunity of becoming fully developed. But is it actually true that this imperfection of form and development is, all things considered, a real loss and disadvantage? Certainly not. It is this comparative imperfection that mainly gives to nature its endless variety of forms, and imparts to it one of its principal charms. If every animal that exists and every plant that grows, were to be developed

into the most complete and perfect form possible, nature would lose half its loveliness and soon become stale and uninteresting. A sameness would prevail which to the eye would be positively painful.

Another fact which is urged by some Evolutionists against design is *the existence of rudimentary organs.* Why, it is triumphantly asked, should a designing cause give to animals organs which are of no use to them? In reply it has to be said that rudimentary organs are certainly presumptive proof in favour of Darwinism, but are no evidence against design. For if a designing cause determined that organic forms should be modified by means of natural selection to suit the conditions under which they exist, then rudimentary organs must of necessity, in course of time, make their appearance, unless specially prevented by other means. But is the absence of these special means evidence against a designing cause? The burden of proof remains on those who maintain that it is. Are rudimentary organs an evil of such a character as to warrant the assumption that a designing cause must certainly adopt special means to prevent their existence? Unless this can be shown to be the case the existence of such organs can be no evidence against design.

There is one important point which has been too much overlooked in discussions on this question of rudimentary organs and imperfectly-formed organisms. It is, *in the attainment of ends, unity of plan, form, and process is always observed.* For a new and different end we seldom have a new and different process. We

find that the new end is almost invariably reached by a simple modification of the old process, or plan of operation. This is exactly what we might *a priori* expect in the action of an intelligent power observing the great law of parsimony. These apparent imperfections in nature, which have been so often adduced by Evolutionists as evidence against design, are thus but the simple and necessary consequences of a rigid observance of that law. They indicate, as it were, the operation of a perfect intelligence which in reaching an end takes all things into consideration, so that, in operating according to one law, it does not violate another.

One most important service rendered to Philosophy by Darwin and other modern Evolutionists has been the exhibition of the true process of nature. Evolution has shown that nature progresses by imperceptible gradations, that the process is everywhere continuous without any breaks or sudden leaps. There is change, but this change does not consist in special creations of new forms, or of new processes, but in the modifications of those already in existence. It is somewhat strange that this discovery of the method of nature should have led in the case of many men to the abandonment of Teleology; in other words, that it should have led to the belief that if nature be under the control of a governing intelligence things *ought* to happen otherwise. Some of the old notions regarding Teleology have no doubt had something to do in engendering this belief; this new discovery of the processes of nature has overturned many of these, but

it leaves unshaken the foundations of the great principle, or rather so widens and deepens those foundations, that we are enabled to erect upon them a far nobler structure than our fathers could conceive.

Upon this principle Determinism throws a new light. The state of the Universe at the present moment was determined by its antecedent states. We cannot suppose that one determination has resulted from another in an infinite regression without any beginning, for this would imply that things which are at present in operation are a part of a series which has been in operation from eternity. There must have been a first determination—a commencement of the series. If any man should affirm that the succession of events had no beginning, but has been in operation from all eternity, it would be difficult indeed to prove him to be in the wrong; but, on the other hand, it would be far more difficult, nay, utterly impossible, for him to prove his assertion. Indeed, one can hardly help feeling that many have been led too hastily to adopt the hypothesis of an eternal universe and an infinite series of events through a disinclination to admit the existence of a creative intelligence.

Creation and annihilation are supposed by many to be *absolutely* impossible—things indeed which cannot even be conceived. This view, however, is evidently grounded upon an error regarding the nature of conception itself. We cannot, it is true, form *a sensuous intuition* either of the creation or of the annihilation of the universe; but we can *in thought* annihilate both the Creator and the Universe. In fact, we can in

thought annihilate everything but Time and Space. We can conceive that there might never have been a God or a Universe, but we cannot conceive that there might never have been Time and Space. Time and Space are necessities of thought, and this is, of course, so far in favour of Kant's theory of their subjective nature.

Our proof of the existence of God undoubtedly rests on the principle of Causation. If something now exists, we know from that principle that something must have always existed. Something does now exist; therefore something must always have existed. The question then is—What is this something which has always existed? Is it God or the Universe? One party holds to the former, and another to the latter view. The theory of an eternal Universe is, however, burdened with the absurdity of an eternal succession of events. Had there been nothing to account for but simply matter and motion, the one theory would have been about as probable as the other; for eternal matter and eternal motion are in themselves just as conceivable as an eternal Being. But there is more to be accounted for than eternal existence: there is a succession of orderly events with a plan and a purpose running through them, and this cannot be explained by mere matter and motion; more is required.

The other view is not burdened with the same difficulty. We do not, according to it, require to assume an eternal succession of events. All that we require to assume is an eternal God, infinite in all his attributes. For although we suppose the operations of

the Deity to have taken place in time, yet we must assume that these operations were determined from eternity. A Being infinite in wisdom and knowledge does not require to alter, improve, or develop his plans or purposes. These must, like himself, be ever perfect and ever existent in his mind. Thus what the Deity actually does in time he must have determined from all eternity. We do not require to assume a first determination, for there was no first. His determinations are eternal, like himself. In this case there is no necessity for supposing that the succession of events which has constituted the history of the universe has been eternal.

Further, the theory of an eternal God gives a rational explanation of the order and intelligence which manifestly run through this succession of events: a thing which the other theory fails to do. If we suppose that there had been no God, and that matter and motion had been eternal, this would not account for the past history of the universe. Matter and motion will not explain the evolution of things. Evolution is produced, as has been abundantly proved, neither by matter nor by force, but by the *determinations* of matter and force. Eternal matter and eternal force would be impotent to produce the evolution of an orderly universe. The matter and the force must be *determined*. Whence, then, could they have got this determination had there been no God? They could not have obtained it, as has been already indicated, from Natural Selection. Natural Selection cannot produce anything. It must have previously-existing organisms

on which to operate. We cannot therefore begin with natural selection, for these previously-existing organisms could not themselves have been formed without those very determinations, the source of which is now in question. Natural selection could only begin to act when these organisms became so numerous as to have to enter into a struggle for existence. We must always bear in mind that natural selection is simply the preservation of the fittest by the destruction of the unfit.

There can be no doubt that a very large portion of the order and harmony in that long succession of events which has constituted the history of the universe has been due to natural selection: for the continual preservation of those things best fitted for the conditions in which they exist by the destruction of those least fitted, naturally tends to order and harmony. Natural selection must, however, be regarded as simply an integral part or link in that succession of events which we are now considering. The whole, natural selection included, may be viewed as a series or succession of determinations, the one resulting from the other. But this just leads us back to the commencement of the series for the rational grounds of the process, and evidently points to Theism; since eternal matter and motion leave the whole affair in utter darkness and confusion.

APPENDIX

DETERMINATION IN RELATION TO FREE-WILL

CHAPTER I

SELF-DETERMINING POWER OF THE WILL

From what has been proved regarding the absolute impossibility of determination being the result of force, we are led to the very source of that endless confusion which has arisen regarding a self-determining power of the will. Action, effort, force, and energy are the characteristic powers of the will. In raising a weight, for example, whatever may be the immediate source from which the mechanical force is derived, we feel conscious that the work is done by an effort of the will. Or if we press the hand against an object, we feel that the pressure is the result of a conscious effort. It is from such experiences that we derive our very conceptions of power and force. As Mr. Lewes well remarks, "without the experiences of pressure there could be no basis for the conceptions of force."

Whatever is done by the will is certainly the result of action, effort, force, or energy of some kind or other. This, I think, will be universally admitted. A self-determining power of the will must, therefore, be an unthinkable conception. For it is absolutely impossible that determination can be affected by action, effort, force, or energy. It is the unthinkable nature of the conception which has so long prevented its absurdity from being clearly seen; and hence the confusion to which it has given rise. We possess a self-determining power, as will afterwards be shown, but it is certainly not as will.

It is, of course, true that if I wish to select one out of a number of objects put before me for choice, I fix on some particular one out of the many. This is done by an act of the will, of which I am directly conscious; but it must be observed, as has already been shown in Chapter V., that the mere act of fixing on the particular object is of a nature essentially different from that of determining the particular one to be fixed on. Consciousness testifies that the will is the cause of the former; but it affords no direct information as to how the latter is brought about. I am directly conscious of the act of the will; but not, at the moment, of the manner in which it was determined. I am conscious that the will is a self-*acting* power, but not that it is a self-*determining* power. It acts, but it cannot direct its actions.

Testimony of Consciousness.—One is conscious of perfect freedom if he feels that he has the power and opportunity of doing as he likes, or doing whatever he

chooses. It matters not how he comes to have that choice; for this does not in any way affect his consciousness of freedom.

On reflection, however, we find that we may possess all this freedom and yet be under an absolute necessity. If our choices are not free, the simple power of *doing* whatever we choose does not relieve us from necessity. If we are to be free in the Arminian sense of the term, we must be free to choose as well as to act: we must have the free choice of our choices. But to choose our choices, after all, would simply be another form of doing as we choose. The will, it is maintained, must have the direct power of making its choices. When two or more things are placed before us for choice, the will is free to choose either the one or the other. It chooses A for example; but it might as well have chosen B. An appeal is made to consciousness on this point, and consciousness supports the appeal. The advocates of free-will, then, regard the decision as final and conclusive against the doctrine of philosophical necessity, and argue that consequently the same cause acting under the same conditions does not always produce the same effect.

The decision of consciousness certainly appears at first sight to be in favour of the Arminian free-willer. Accordingly necessitarians, in order to maintain their position, have generally met free-willers by questioning the accuracy of the alleged facts of consciousness in regard to the matter. In this, however, necessitarians seem to have the worst of the argument; for

there can be little doubt but that the facts are pretty much as the free-willers state them to be.

Consciousness must be in the right, and both parties profess to accept her decision. But the strange thing is that if she should give her decision in favour of the Arminian form of free-will, she would contradict herself, for as we have seen she has already given a contrary decision.

If we examine the matter carefully we shall find that the contradiction is not in the facts of consciousness, but in the interpretation of these facts. Consciousness is right; but the conclusions which have been drawn are wrong. Let us see what the facts really are. When two or more objects are placed before me for choice, I am conscious of being able to choose either the one or the other independently of all external conditions. I feel that nothing outside of me can possibly prevent me from choosing either the one or the other. I am conscious, in short, of perfect freedom in so far as things external have any influence.

This is, I think, a fair statement of the facts of consciousness. I have nowhere seen them stated more strongly. Indeed, this is the highest form of freedom of which we can possibly be conscious. But what consciousness has given us here is not freedom in the Arminian sense of the term, viz., superiority to the principle that the same cause acting under the same conditions will always produce the same effect.

Although I am conscious of being able to choose independently of *external* conditions—conscious that nothing outside of I or self controls my volitions, I

cannot say the same thing in regard to *internal* conditions. When I chose A, for example, I was conscious that I could have chosen B instead of it, though all conditions external to my own individuality had been absolutely the same; but I was not conscious (and here we are approaching to the very core of the free-will controversy) that I could have chosen B if I or self had been in absolutely the same state as at the moment when A was chosen. If I am conscious of anything in regard to the matter, it is, that were I in the same state I would do the same thing over again, viz., choose A and not B, and that I could not possibly choose B unless some internal change of state of some kind or other took place. On this point consciousness, however, does not seem to give any direct deliverance. I am conscious of what my *convictions* and *beliefs* are in regard to the matter, but this is no guarantee that those convictions and beliefs are right.[1] I have this assurance, however, that I am right, viz., that to assume the contrary would be to contradict the direct testimony of consciousness on another point.

When any of our internal states, either of feeling or of intellect, becomes a phenomenon of consciousness, it is regarded as a something *external* to the I or self. We affirm in regard to it that we are, in so far as it is concerned, free to choose either A or B. We are conscious that it does not in any way necessitate our choice. This, however, does not prove that choice is

[1] Free-willers in their appeal to consciousness seem frequently to mistake the consciousness of their convictions and beliefs on points in regard to freedom for the consciousness of the thing itself. See *Philosophy of Theism*, p. 141.

not actually controlled by internal states; states which at the moment do not fall under the eye of consciousness.

Were we conscious of anything external to self necessitating our choice, or preventing us from selecting either the one thing or the other, we should not feel responsible for our actions. We are responsible for things internal; not for things external to self. If we do a bad action from a bad motive we are self-condemned, because we feel that the evil lies within, or we would not have done it. We feel that our choice is the result of internal, not of external conditions; for we are directly conscious that external conditions do not necessitate our choice. When we do wrong, the source of the evil lies in our internal conditions or states, or, in Scripture language, "in the state of the heart." Bad dispositions, bad inclinations are the fundamental cause of the wrong choice, and consequently of the wrong doing. "I" choose the right or the wrong as the case may be; but I am determined in my choice by my internal state at the moment of choice.

In one respect our choice may be said to be determined by motives. But the real determining cause, however, is not anything external to self, for whether any external influence will succeed in determining our choice will depend on internal states: the internal conditions decide the matter. It must, however, be borne in mind that when any of our internal states, either of feeling or intellect, becomes a phenomenon of consciousness, it is regarded as a something objective, or external to the "I" or self, and we feel

in regard to it, as we do of all things else objective, that we are in so far as it is concerned free to choose either the one thing or the other. This, however, affords no warrant for concluding that our choice is not actually controlled by our internal states.

Our internal states at any moment will always enable us to act independently of any particular state seen at the moment objectively by the eye of consciousness: hence our consciousness of perfect freedom. In fact, the very necessity we are under of choosing according to our internal states at the moment of choice renders it impossible that we can be otherwise than conscious of perfect freedom; for, do as we may, we cannot determine differently from the state of self at that moment. We have, in other words, the two factors, self and its environments. The environments solicit to a certain line of action, but we feel at perfect liberty to comply or not with the solicitations. If we comply we are conscious that the choice is our own, and we accept the responsibility of any praise or blame which may be attached to such a choice. We are conscious that it was self which made the choice, and to self and self alone belongs the praise or the blame.

Did the will possess a faculty whereby it could arbitrarily produce volitions contrary to those which would be determined by our internal states, it would not confer upon us the consciousness of a higher freedom than we now possess. On the contrary, the operation of such a faculty would be felt as an infringement of our liberty, for we should feel it as a something hindering and preventing us from freely doing as we

like. Besides, we should not consider ourselves responsible for a faculty acting so independently of our desire and wishes. And in addition actions so produced would possess no moral qualities.

I submit that the foregoing is a clear and rational explanation why we regard ourselves as free and responsible moral agents.

CHAPTER II

HOW THE CAUSE OF CHOICE ESCAPES THE EYE OF CONSCIOUSNESS

Our thoughts cannot well be directed to two or more different things at the same moment. When they are directed to the objective, or external conditions, they cannot at the same moment be directed to our internal states. Our thoughts may pass from the one to the other with almost instantaneous rapidity, but they cannot embrace both at the same instant. At the instant we are thinking of the one, the other is not before the eye of consciousness. At the moment of choice our thought must be necessarily directed to the *objects* of choice: it is therefore impossible that we can be conscious of the internal states which at that moment determine the choice. Before the eye of consciousness can be turned inwards, the choice is made and the operation over. We are directly conscious of the *act* of fixing on the particular object, and this prevents us at the moment from observing the operation of those internal causes which lead to the particular one being fixed on. In other words, we are conscious of the volition, but not of the choice. The consciousness of

the former prevents us from detecting the latter; and it is only by reflection that we arrive at a knowledge of the causes which determine the choice. Free-willers in the appeal to consciousness mistake volition for choice; the act of fixing on the particular object for the determining of the particular object on which to fix. In other words, they mistake the cause of volition for the cause of choice.

But supposing we could turn our thoughts inwards at the moment of choice, with the view of observing those conditions which determine the will, we could rarely succeed in detecting the true cause of choice. We are conscious of our thoughts, our feelings, our desires, and our inclinations, &c., but not of the faculties, or powers themselves on which they depend, for these are not phenomena of consciousness. True, I am self-conscious. I have not only an empirical consciousness of my thoughts and feelings, &c.; I have a transcendental consciousness of self, I know that "I" exist, and that I am the subject of these thoughts and feelings; but I am not directly conscious of that in me which gives rise to them. Were it not for the manifestations of those powers of the mind we could never know from consciousness that they exist.

Of course, I am not directly conscious of my conscious self. This is impossible; for as all knowledge is dual, before I can be conscious of self I must make it an object of consciousness, and this can only be done under the conditions of self-consciousness. I am conscious of the objective self, but not of the

subjective self. I am conscious of the consciousness known, but not of the consciousness knowing. The subject in the nature of things cannot be its own object. It cannot at the same time be both subject and object. "The subject," as remarks Schopenhauer, "is the condition of the existence of ideas and can never itself become idea or object." [1]

Now, although by apperception I can cognise myself as the subject of thoughts, feelings, inclinations, &c., I am not able to cognise those modifications of self which give rise to them. All that I know or am conscious of, is that those thoughts, feelings, &c., are due to self, but in what way they result, is not known to me. But it is upon those modifications of self, of which I am not conscious, and which lie in the background of the feelings and inclinations of which I am conscious, that the determination of the will most frequently depends.

Take the case of the drunkard. The continued use of strong drink tends to engender a desire for the drink. As the habit is continued the appetite for the drink increases, and along with this the moral power of resisting the temptation to indulge that appetite gradually becomes weaker and weaker till the man ultimately becomes what is called a drunkard. That which now determines the man to drink, and prevents him, as it were, from returning to habits of sobriety, is not so much the mere appetite for the drink, as that change which has taken place in his mental or physi-

[1] *World as Will and Idea*, iii. 485; see also ii. 412. *Fourfold Root*, pp. 165–168. (English translations.)

cal constitution which has produced the appetite and diminished his moral strength of resistance.

The man is directly conscious of the appetite, but not of that in his nature which creates it. He is conscious of the change which has taken place in his appetite and desires, but not of that corresponding change in his mental and physical constitution which gives rise to the change in appetite and desires. The fruit is bad because the tree is bad.

The main determining cause of the drunkenness, therefore, lies in the background of consciousness. And what holds true of vice, holds equally true of virtue. The real determining cause of a life of moral goodness lies not so much in the moral sentiments and affections as in the excellency of that moral nature from which those sentiments and feelings spring. The fruit is good because the tree is good. The religion of Christ, for example, regenerates the man by renewing his *nature*. By this means the poles or tendencies of his life become, as it were, reversed. But they are reversed mainly by causes which do not fall under the eye of consciousness.

The internal states determine our choice, but the determination of the internal states themselves requires to be accounted for. What gives them their particular determined character? Are these states determined by prior states, and these again by states still prior, and so on? If this be the case, then, after all, although we have the consciousness of perfect freedom and responsibility we are still under necessity—a necessity from which there can be no escape.

The states which determine our choice, as we have seen, are not directly under the control of the will and cannot be altered directly by an act of choice. These states are determined by prior states of which we have no consciousness. Now, if these states are but links in the great chain of causation, stretching back indefinitely, into a past eternity, then those actions which we regard as free are in reality pre-determined. Here we come to the unsolvable difficulty: a difficulty which it seems impossible to remove. How in this case can responsibility be made to harmonise with the great law of causation? The only answer I can give is that I cannot tell. It is to me an unsolvable mystery. One thing I am certain of, and it is, that the doctrine of universal causation does not in the least degree weaken my conviction that I ought to do right, or lessen my feelings of remorse when I actually do wrong.

If one is directly conscious that the choice of his actions is *his own* (and he cannot help feeling this, no matter what difficulties there may be about the causes in operation prior to volition), then he also *cannot help* feeling that he is responsible. When I feel conscious that the choice was my own, I feel responsible, without entering into any philosophical inquiries as to whether that state in me which led to my making the choice was connected with antecedent states or not.

It is needless to maintain that a belief in moral or metaphysical necessity destroys all feeling of responsibility for our actions, for facts clearly show that the

contrary is the case. Necessitarians have just as keen a sense of moral responsibility as free-willers. There probably never was, for example, a man who had a deeper sense of moral obligation than Jonathan Edwards, and yet he was the greatest advocate of moral and metaphysical necessity that ever lived. Calvinists, a class who believe in the doctrine that everything which comes to pass was foreordained, have always been noted for their stern moral rectitude. "They abhorred," says J. Anthony Froude, "as no body of men ever more abhorred, all conscious mendacity, all impurity, all moral wrong of every kind so far as they could recognise it. Whatever exists at this moment in England and Scotland of conscientious fear of doing evil is the remnant of the convictions which were branded by the Calvinists into the people's hearts."[1]

Materialistic or mechanical necessity, which destroys free-will and makes men little else than machines, will no doubt tend to weaken the feelings of responsibility; but a belief in moral necessity, which is simply moral inability, or a belief in metaphysical necessity, which differs not from absolute certainty and fixity of all future events, has certainly no such tendency.

When the matter is more deeply investigated it is found that the foregoing objections and difficulties are as formidable against what is called the Arminian theory of free-will as against what is called the Necessitarian theory. The only difference being that the objections, in the case of the latter theory, are obvious

[1] *Calvinism*, p. 56.

to the popular mind; whereas, in the case of the former, they are not readily seen without subjecting the theory to a searching analysis.

One of the main causes which has rendered it so difficult to detect the irreconcilable nature of the doctrine of free-will with that of causation, is the obvious confusion which has arisen in regard to choice as an *act* of the will; or, in other words, in confounding *determination* with what is called the *act* of choice; or, in other words still, of confounding *determination with volition*—or the act of fixing on a particular object, with the determining the particular object to be fixed upon.

According to the free-will doctrine, choice, or determination is effected by an *act* of the will, or perhaps more properly, choice or determination is an act of the will. But, I trust, it has already been demonstrated that it is absolutely impossible and inconceivable that choice can be anything of the nature of an *act*. Choice or determination must in the nature of things be prior to the act of the will. Determination is not an act, neither can it be produced by an act. Determination must have a cause, and a cause which must be the effect of a prior cause, which in turn demands a cause still prior, and so on. Here, as in the Necessitarian theory, the determined character of an action is fixed by the determined character of the preceding action, and we are landed into the same difficulty in regard to moral responsibility as in the other theory.

But supposing it were possible, which it certainly

is not, that choice can be an act of the will, it does not remove the difficulty. The will, before determining itself to any definite act, must have in itself a certain determination towards that particular act. This internal determination of the will may result from the state of the intelligence, or it may result from the state of the sensitivity, or from some other source; but, from whatever source derived, it must give the will a certain determination towards that particular act before it goes into action. If the will chooses A rather than B, then before fixing on A it must have some particular internal determination towards A rather than B, or A would not be chosen in preference to B. All things external being the same, the will could not possibly have chosen B unless its internal state in some way or other had been different. Under absolutely the same conditions, external and internal, no other choice was possible; for the same cause acting under absolutely the same conditions must always produce the same effect. The free-will theory when thus analysed differs not essentially from the Necessitarian. According to both theories, without some *change in the antecedents* no other choice could possibly have taken place than the one which actually did take place. According to both theories, choice is due to a particular internal determination towards that particular thing chosen; and, according to both theories, a difference in the internal state on which the choice depends would result in a different choice; and this difference may as readily be effected in the case of the one theory as in that of the other.

If it be maintained that the will, before making its choice, has no internal determination towards one choice more than another, and that it determines itself from a state of absolute indeterminateness; then such a choice would not, as Professor Schurman remarks, "differ from caprice, and freedom could have no other meaning than contingency or chance."[1] Besides, such a choice would possess no moral qualities, either good or bad.

Further, if a change in the antecedents must occur before a different choice can take place, then, as already stated, only one choice is possible. On the other hand, if a different choice should occur without any change in the antecedents, then we should have an event without a cause. According to the law of causality no change of any kind can take place without a cause. But here we have a different choice with absolutely nothing to account for it: a change without a cause.

Either both of two lines of action are possible under absolutely the same conditions, or they are not. If the latter, then only one of the lines is possible, and without a change of conditions the other is absolutely impossible. This is the doctrine of necessity. If free-will at bottom differs essentially from necessity, then it must conform with the first supposition, viz., that either line of action is possible under the same absolute conditions. Suppose line A is chosen and that, everything remaining the same, line B is next chosen; then were such to happen, and this is abso-

[1] *Kantian Ethics*, p. 6.

lutely possible if free-will be true, we should have in this case an event without a cause. No cause could possibly be assigned for the change from choice A to choice B. The change would be absolutely unaccountable. Free-will is therefore opposed to the necessary and universal law of causation. But, more than this, it tends to destroy moral distinctions and human responsibility. For there can be no moral qualities in anything resulting from a change which happened without a cause, nor can anybody be responsible for it. A change without a cause is a thing utterly beyond the power of any one either to foresee or prevent, and no one could either be praised or blamed for its happening.

All those difficulties which beset the doctrine of necessity, equally, as we have seen, beset free-will: with this additional one, that it contradicts the principle of causality.

Lotze on Free-will.—The foregoing objections, based on causation, Lotze[1] has endeavoured to remove as follows. "All that we think and designate," he says, "as an effect undoubtedly requires its cause, but it is a question whether we are entitled to consider every event that happens as in this sense an effect." But, in reply, we must consider every event—a something which comes to pass or begins to be—as the effect of some cause. An event without a cause would just be an effect without a cause; a thing not only impossible but what no being finite or infinite could either foresee or prevent. "What constitutes," says Lotze, "the

[1] *Microcosmos*, i. 260.

absolute authority of the causal law is not that every part of the finite sum of things actual must in the finite sphere be produced by fixed causes, according to universal laws, but that each constituent once introduced into this actual course, continues to act according to these laws." It may be true, as he states, that every part is not *produced by fixed causes* according to universal laws; but it certainly is true that every part must be produced by some cause; it cannot happen without a cause. It would seem, however, that Lotze imagines that some things come to pass without causes, for he does not regard everything which comes to pass as an effect. A thing *coming to pass* without something bringing it to pass can certainly be nothing else than an effect without a cause, and a violation of the great law of causation.

But, unless something can come to pass without a cause, the difficulties besetting free-will which we have been considering, which Lotze's theory was designed to remove, remain. Even this would not remove them: for nothing could be more utterly beyond the control of any being, and for nothing could he be less responsible, than for events happening without causes.

Ethical consequences.—I may now refer to the ethical consequences which some have deduced from the Doctrine of Necessity. It has been supposed by some that it leads to Hedonism and Utilitarianism in morals. Such, however, is not the case. It is evidently the attempt to solve the unsolvable mystery of how the universal law of causation can be made to harmonise with moral evil, which has led to the adoption of those

theories of morals. Moral evil is a fact as real as that of causation, and it will not do to sacrifice the one for the sake of the other. That I "ought" to do right, and that if I do wrong I am morally guilty, are facts of which we are as conscious as we can be of anything. Consciousness will never allow us to identify moral action with beneficial results. The conceptions of duty and responsibility are fundamental and can never be obliterated. "The voice of humanity," says Professor Schurman, "as caught alike in language and in thought, has proclaimed the incommensurability of right with the beneficial and of wrong with the detrimental. It is sure that pleasure is not morality nor misery immorality: and that the moral life does not consist in the pursuit of the one or the avoidance of the other."[1]

[1] *Kantian Ethics*, p. 73.

CHAPTER III

KANT ON FREEDOM

It may be thought that by the adoption of Kant's theory of Freedom a rational explanation of the doctrine of free-will may be obtained. A careful consideration of Kant's theory will, however, I think, show that such is not the case. At the very outset, before any one can adopt Kant's explanation of freedom, he must be prepared to adopt not only the ideality of space and time, but the ideality of everything in space and time. Kant is very explicit on this point. "I cannot see," says he,[1] "how they who insist on regarding space and time as modes pertaining to the existence of things-in-themselves, can escape the fatality of actions." "If phenomena are things in themselves, freedom is impossible." [2]

In all changes *substance* remains and the *accidents* or *states* alone are changeable. All phenomena in the succession of time are only changes, that is, successive being and non-being of the determination of substance. And all changes, be they what they may,

[1] *Metaphysics of Ethics*, p. 143, 3rd edition.
[2] *Critique of Pure Reason*, Bohn's edition, p. 532.

take place according to the law of the connection of Cause and Effect.

According to Kant there are two modes of causality, the causality of *nature* and the causality of *freedom*. The causality of nature "is the conjunction of a particular state with another preceding it in the world of sense, the former following the latter by virtue of a law. And as the causality of phenomena is subject to conditions of time, and the preceding state, if it had always existed, could not have produced an effect which would make its first appearance at a particular time, the causality of a cause must, therefore, itself be an effect —must itself have *begun to be*, and according to the principle of the understanding, itself requires a cause." And this cause again must have been the effect of a previous cause, which in turn also required a cause, and so on.

The causality of freedom, on the contrary, is a faculty of the *spontaneous* origination of a state; the causality of which, therefore, is not subordinated to another cause determining it in time. This faculty relatively to a new state or condition is a determinator, but is not itself determined. Freedom in this sense is a pure transcendental idea. "Reason creates the idea." "How freedom is possible," says Kant, "remains totally incomprehensible."

The element in a sensuous object which is not itself sensuous, Kant terms *intelligible*. If an object which is regarded as a sensuous phenomenon possesses a faculty which is not sensuous, but by means of which it is capable of being the cause of phenomena, the

causality of an existence of this kind is regarded by him from two different points of view. It may be considered to be *intelligible* as regards its *actions*—the action of a thing which is a thing in itself—and sensuous as regards its effects: the effects of a phenomenon belonging to the sensuous world.

Every effective cause must possess a *character*: a law of its causality without which it would not be a cause. Every sensuous object possesses an *empirical* character which guarantees that its actions, as phenomena, stand in complete conformity to unvarying natural laws with all other phenomena, and thus constitute a series in the order of nature. This sensuous object must also possess an *intelligible* character which guarantees it to be the cause of those actions, as phenomena, although it is not itself a phenomenon nor subordinate to the conditions of the world of sense. The former is the character of the thing as phenomenon: the latter the character of the thing as a thing-in-itself.

Now, says Kant, this active subject would, in its character of intelligible subject, be subordinate to no conditions of time, for time is only a condition of phenomena, and not of things in themselves. No *action* would *begin* or *cease* to be in this subject: it would consequently be free from the law of all determination in time—the law of change, namely, that everything *which happens* must have a cause, would have no application.

In virtue of its empirical character, this subject would at the same time be subordinate to all the

empirical laws of causality, and, as a phenomenon and member of the sensuous world, its effects would have to be accounted for by a reference to preceding phenomena, and this again by reference to phenomena still prior, and so on.

In virtue of its intelligible character, on the other hand, the subject must be regarded as free from all sensuous influences, and from all phenomenal determination. As nothing *happens* in this subject, this active existence must in its actions be free from and independent of natural necessity, for this necessity exists only in the world of phenomena where every event must have a cause.

All the actions of man, according to Kant, in the world of phenomena—all the actions which take place in time and space—are determined by his empirical character, and the co-operative causes of nature. "If," he says, "we could investigate all the phenomena of human volition to their lowest foundation in the mind, there would be no action which we could not anticipate with certainty, and recognise to be absolutely necessary from its preceding conditions, so far as relates to this empirical character; therefore, there can be no freedom; and it is only in the light of this character that we can consider the human will, when we confine ourselves to simple *observation*" (p. 340). And again: "No phenomenal cause can absolutely and of itself begin a series. Every action, in so far as it is productive of an event, is itself an event or occurrence, and presupposes another preceding state, in which its cause existed. Thus everything that

happens is but a continuance of a series, and an absolute beginning is impossible in the sensuous world" (p. 336).

How then, according to Kant, is freedom possible when every action in its empirical character is thus completely determined and absolutely necessary? Kant's answer is, that although human actions are unchangeably determined in the empirical character of each individual, they are nevertheless free, for that empirical character is itself the freely originated product of the intelligible character. This intelligible character is a faculty which originates the sensuous condition of an empirical series of effects. This intelligible cause possesses absolute spontaneity, which, according to Kant, is freedom. "Thus we find," he says, "what we could not discover in any empirical series, namely, that the *condition* of a successive series of events should itself be empirically unconditioned. In this case the condition stands *out of* and beyond the series of phenomena, and therefore not subject to any sensuous condition" (p. 341).

Every action which takes place in space and time (and it is only for these that we may be considered responsible) is determined by its empirical character, and is thus necessary. Each act is but a link in an unbroken chain of causation. It is only the intelligible cause that is free, but this intelligible cause cannot, according to Kant, co-operate with the empirical in the production of an empirical effect. How then after all can these empirical effects be free? It will not do to say that it is because this empirical cause is itself

the effect of the non-empirical and intelligible cause. For it must be borne in mind that what we call the empirical effect is but one of the links in the necessary chain of empirical causation. In relation to what succeeds, it is a cause, but in relation to what precedes it is an effect. There is in fact neither room nor necessity for the action of the intelligible cause. This intelligible cause cannot come in and break the necessary connection of empirical cause and effect. It is, of course, true that if the effect were the direct product of the intelligible cause it might be free in the Kantian sense of the term. Kant observed this, and hence to secure freedom he assumes an intelligible causality for some of our empirical actions. "Sometimes we discover," says Kant, "or believe that we discover, that the idea of reason (the intelligible cause) did actually stand in a causal relation to certain actions of man; and that these actions have taken place because they were determined not by empirical causes but by the acts of the will upon grounds of reason" (p. 349).

But Kant's theory of freedom is liable to another fatal objection pointed out by Schopenhauer in his Criticism of the Kantian Philosophy,[1] viz., that the category of causality, like all the other categories, has no relation beyond the sphere of phenomena, and consequently cannot be applied to the intelligible character—the thing in itself. "It is therefore meaningless," says Professor Schurmann, "to maintain that the intelligible character has any causality, whether

[1] *World as Will and Idea*, 122, 123.

in relation to the empirical character in general, or to the specific acts that are determined by it. Kant here falls into the same contradiction as when he postulates a nominal world as cause of our sensations, though the category of causality has no application till the sensations have been constituted by thought into the phenomenal world of our knowledge."[1]

Necessity rather than freedom seems logically to follow, as has been shown by Schelling and Schopenhauer, from Kant's theory of freedom resting on an intelligible character which has neither relation to time nor to the category of causality. This intelligible character, or cause, is supposed to determine itself spontaneously without any prior determination. But, as Professor Schurmann remarks,[2] did it determine itself from absolute indeterminateness without any ground whatever, it would not differ from caprice, and freedom could have no other meaning than contingency or chance. "It must, therefore, before determining itself to any definite act, have in itself, as Schelling concludes, a certain determination; and this cannot be anything else but its own essence, its own inmost nature, which is no indefinite universal, but the definite character of this particular individual. The intelligible essence can accordingly, so certainly as its actions are absolutely free, as certainly act only in accordance with its own inmost nature; for that alone is free which acts according to the laws of its own being, and is determined by nothing else either within or without. Individual action is accordingly

[1] *Kantian Ethics*, p. 20. [2] *Ibid.* p. 6.

the consequence of the inner necessity of a free being."

It is quite apparent that Kant's theory of freedom resting on the intelligible character differs not logically from Schopenhauer's theory of absolute determination, and is therefore virtually one of necessity and not of freedom.

The necessity of Schopenhauer is, however, purely logical, or metaphysical. "Necessity," he says, "has no other true and distinct meaning than that of the infallibility of the consequence when the reason is posited."[1] This is also the view held by Edwards, who states that metaphysical or philosophical necessity is nothing different from their certainty; not the certainty of knowledge, however, but the certainty that is in things themselves, which is the foundation of the certainty of the knowledge of them. "Philosophical necessity," he says, "is really nothing else than the full and fixed connection between the things signified by the subject and predicate of a proposition which affirms something to be true."[2]

[1] *Fourfold Root*, p. 181.
[2] *Treatise on the Will*, part i. section 3.

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